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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

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of Natural History
Bulletin

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Field Museum of Natural History

Founded 1893

President and Director E. Leland Webber

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Human skull with face formed from shredded fiber, gum, coconut milk, and possibly breadfruit paste. From Southern Malekula, New Hebrides. Cat. 133149. Collected by curator A.B. Lewis during Joseph N. Field Expedition of 1909-13. Photo by Ron Testa.

The face is shaped to resemble that of the recently deceased man from whom the skull is taken. The skull is then placed atop a life-size effigy of the man, also formed to resemble that of the deceased. After being borne in funeral rites, the effigy, or rambaramp, is allowed to decay, no special efforts being made to preserve it.

See pages 16-19 for discussion of "South Seas Islands: Paradise and Perdition," theme of forthcoming sequence in National Endowment for the Humanities Learning Museum Program at Field Museum.

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FIELD BRIEFS

Staff Appointments

Field Museum's new assistant development officer is Larry E. Clary, who most recently was with the Development Office of the University of Chicago. A native of the Chicago area, Clary holds a B.A. in English from the University of Chicago. He succeeds William J. Maurer, who resigned to become university relations director for Purdue University, Calumet Division.

Jacqueline M. Felicetti has been named membership secretary, succeeding Dorothy Roder, who is now head of the Field Museum Tours Program. Ms. Felicetti comes from the American Bar Association, where she was acting director of membership. She is a native Chicagoan and holds a B.A. from Loyola University of Chicago.

Philip Hanson, formerly head, Harris Extension Loan Program, has been promoted to head, Group Programs Division, succeeding Carol Scholl, who has resigned. Raymond F. Bernard has returned to Field Museum to serve as resource coordinator of Harris Extension, a new post within the recently reorganized Harris Extension, a unit of the Department of Education. Bernard was formerly an assistant in the Division of Reptiles and Amphibians.

Tanisse R. Bushman has been named managing editor of scientific publications. A native of LaGrange, Ill., Miss Bushman was most recently an editorial assistant at Arthur Young & Co., Chicago. She succeeds Pat Williams, who had held the post since 1961. Mrs. Williams resigned to accept another position.

Norman W. Nelson Retires

Norman W. Nelson, assistant director, administration, retired in November, 1979, after serving eight years in that position; prior to that he had been Field Museum's business manager, the post he occupied upon joining the staff in 1965. As assistant director, administration — a new position created in 1971 — Nelson's area of responsibility included business and financial matters, building operations, personnel, security, and other general services.

Nelson's contribution to Field Museum's growth and development during his almost 15 years on the staff were enormous. His stewardship of the finances of the museum was exemplary. When plans for and the execution of the building renovation were required, the responsibility for its supervision and working with the architect, engineers, construction manager, staff space planning committee, and the facilities planning committee of the Board of Trustees were assigned to Nelson. The renovation project is now largely complete and — exceptional among present-day building renovation programs — it is within budget and without large cost overruns. His counsel on all phases of museum operations was always sound, and staff members often found in him a source of sound personal counsel as well. A deep debt of gratitude is due Norman Nelson and we are truly fortunate that he will continue to serve the museum as consultant and as a volunteer.

Norman W. Nelson

Egypt Honors Museum President

E. Leland Webber, president and director of Field Museum, was decorated recently by Egyptian President Anwar Sadat with Egypt's prestigious Order of the Republic. The official notification to Webber of his award read in part: "As the King Tut exhibition is nearing the end of its tour . . . it gives me great pleasure to inform you that President Sadat has decorated you with the Order of the Republic in appreciation of your contribution to the beautiful presentation of King Tut in this country. Your efforts have resulted in a warm and enthusiastic reception for these treasures far greater than we had imagined. We feel that this has contributed immensely to a better understanding of ancient Egypt and a whetting of the appetite for modern Egypt."

Egypt's Order of the Republic was bestowed on Webber at a reception in the Egyptian Embassy, Washington, D.C., on October 25 last. Also awarded the decoration were the directors of the six other United States museums that hosted the exhibition.

Field Museum President and Director E. Leland Webber (left); Ashraf Ghorbal (center), Egypt's ambassador to the United States; and William G. Swartchild, Jr., chairman of the Board of Trustees of Field Museum, shown at recent ceremonies at the Egyptian Embassy in Washington, D.C. Webber was presented with Egypt's Order of the Republic (which he is shown wearing) for his leadership role in Field Museum's outstanding presentation of the Treasures of Tutankhamun exhibition in 1977.

FIELD MUSEUM TOURS

1980 Tour Packages Exclusively for Members

To: China, Egypt, Grand Canyon, England & Wales

Archaeological Tour of Egypt with Nile River Cruise
Jan. 31 – Feb. 17

Little time remains to register for the popular Egypt tour with Nile River cruise. The new and improved program offers an 11-day Nile cruise on our own chartered, modern Nile steamer. In addition, we will visit Cairo, Memphis, Sakkara, Aswan, Abu Simbel, Edfu, Esna, Kom Ombo, Luxor, Thebes, Valley of the Kings and Queens, Dendereh, Abydos, Amarna, Middle Kingdom Tombs at Beni Hasan, Pyramid at Medum, and more.

Eighteen days exploring Egypt, led by Mrs. Del Nord, a doctoral candidate at the Oriental Institute of the University of Chicago, who has traveled extensively in Egypt. Price of $3,595 (based on double occupancy) includes all air transportation, meals, Nile cruise, hotels, tips, taxes, transfers, visa fees, admissions, baggage handling, escorts, and more. The price also includes a $500 contribution to Field Museum. A $500 per person deposit is required for reservation confirmation. The group is limited to 30 persons. Single supplement available upon request. Nile cruise and land

People's Republic of China
May 10-31

The singular experience of a trip to the People's Republic of China can be yours! For its members, Field Museum again offers an opportunity to visit China's major attractions in the company of a well qualified lecturer. The group, limited to 25 persons, will leave Chicago May 10 and return May 31.

After overnight in Vancouver and a visit in Tokyo, you will continue to Peking, China's centuries old capital. Relics of the imperial past, now national monuments, include the magnificent imperial palace, museums, temples and shrines, and the vast park-like Summer Palace on the shores of nearby Kunming Lake. A trip will be made to the Great Wall. The next destination, Nanking, situated on the Yangtse River, is a source of pride for the People's Republic as a center of modern development as well as for its scenic and historic attractions. Of special interest is the visit to the charming city of Kweilin. The awesome surrounding landscape of jutting peaks and rocky caves brings scenes of Chinese painting to life. Kwangchow (Canton) is China's most important southern city, reflecting events in the history of the republic as well as former times when it was China's only port open to foreign trade.

For additional information on this exciting tour, contact the Tours Office and ask for the China brochure.

Stanton R. Cook, courtesy Chicago Tribune

Bertram Woodland

Geology Tour of England and Wales
June 14—July 3

Highlights of this 20-day tour, under the leadership of Dr. Bertram Woodland, Field Museum's curator of petrology (and a native of Wales), will be visits to classical areas of British geology where many fundamental aspects of geology were first discovered. The geological history and scenic development of these areas will be emphasized. Included in the tour are visits to the South Coast, West Country Cotswolds, Welsh Borderlands, North Wales, Lake District, Yorkshire Dales, and the Peak District. The group is limited to 25 persons.

Cost of the tour — $2,640 (which includes a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare between Chicago and London. First class accommodations will be used throughout. The package includes breakfast and dinner daily, chartered motorcoach, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $250 per person.

Exploration of the Grand Canyon
October 3-13

The traveler arriving in Grand Canyon may be given enough time to stand on the South Rim and to gaze in wonder into the depth and silence of the chasm before being hurried away in his charter bus to somewhere else. If he is lucky and has more leisure he may be allowed to hike part of the way down to the Colorado River along a trail as busy as Fifth Avenue on Easter. But there is another Grand Canyon that no man in a hurry sees. The Grand Canyon of exquisite loveliness, grandeur, and solitude.

The trip will begin in the late afternoon of Friday, October 3, with the flight to Las Vegas. The first two days will be spent in the South Rim as an introduction to wilderness hiking and camping and to the geology of the area. The main part of the trip will be a 14-day river trip. The trip will be concerned with all aspects of geology, but will stress the geological history of the area shown in the great sequence of rocks representing about a third of the earth's history, the understanding of the Colorado River, her power, and the tools she uses to carve this great canyon, and the sheer joy and excitement of the river adventure.

It is on the river that we will experience, learn, and understand the canyon, the river, and the Great Southwest. We will "shoot" an unending line of rapids, some but a ripple, others rocky cataracts dropping 15 feet. At no time will we need to portage, but we will have to hold fast with both hands, and secure the luggage well. We'll get wet and tired—but happy and pleased.

We will camp out on sandy beaches, and since it will not rain, the stars and the walls of the canyon will be our companions at night. We will travel in four boats, we'll swim in the tributaries to the Colorado, or dive, jump in, or just soak. We will hike to places of unusual geologic and anthropologic interest, sometimes through the most pleasant and enchanting stream beds and valleys, at times along steep walls and waterfalls.

But above everything else, we'll live a time of geology. We will think earth while we eat, swim, dream, walk, and relax. We will see and study more geology in this one brief period than can be seen anywhere else in comparable time.

The trip will end in Lake Mead, from where by bus we'll travel to Las Vegas, to fly home—sad to leave the Great River and a grand fortnight of our lives, but happy and proud to have experienced it.

Although the trip will not be rigorous, numerous innercanyon hikes are planned. Camping out on the river will be without tents. Meals will be excellent. A pre-trip meeting at Field Museum is scheduled for Saturday, February 9, at 2:30 p.m. Dr. Nitecki will lead the trip. The cost of $1,500 covers all expenses (including air fare, boat fare, meals, camping, sleeping bags, etc.), and a donation of $250.00 to the Field Museum. The trip is limited to 19 persons.

For additional information and reservations for all tours, call or write Dorothy Roder, Field Museum Tours, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605. Phone (312)922-9410.

Three Nandi lion hunters, cast in bronze in 1925 by Carl E. Akeley. This life-size group, together with the pair of lions shown opposite and the triumphant hunters on p. 8, are now on view in Hall 22.

THE SCULPTURE OF CARL AKELEY

VISITORS TO THE HALL OF MAMMALS (Hall 22) are greeted these days by a special welcoming committee: weapon-brandishing Nandi tribesmen and two crouching lions who seem ready to spring. But not to worry! This formidable assemblage—though nearly life-size and realistic in silhouette—is cast in bronze; their spears are forever immobile and the lions entirely stationary.

The arresting group of three castings was created in 1925 by famed sculptor-artist-explorer-taxidermist Carl E. Akeley, Field Museum's staff taxidermist 1896-1909, and presented the following year to the Museum by trustee Richard T. Crane. (A duplicate set is in the American Museum of Natural History.) In recent years the group has been in Hall 10, now closed for renovation.

Just months before his untimely death in 1926, Akeley wrote the following account of lion hunting by the Nandi tribesmen of Uganda:

The story of lion spearing is the sort of thing that is worthy of being recorded in bronze. It is a story of red blood and courage, of the efficiency of primitive men using primitive weapons, weapons made by themselves as they have been made from time immemorial. The story in brief is this: a naked man, by twirling a stick between the palms of his hands, with the end of the stick pressed against

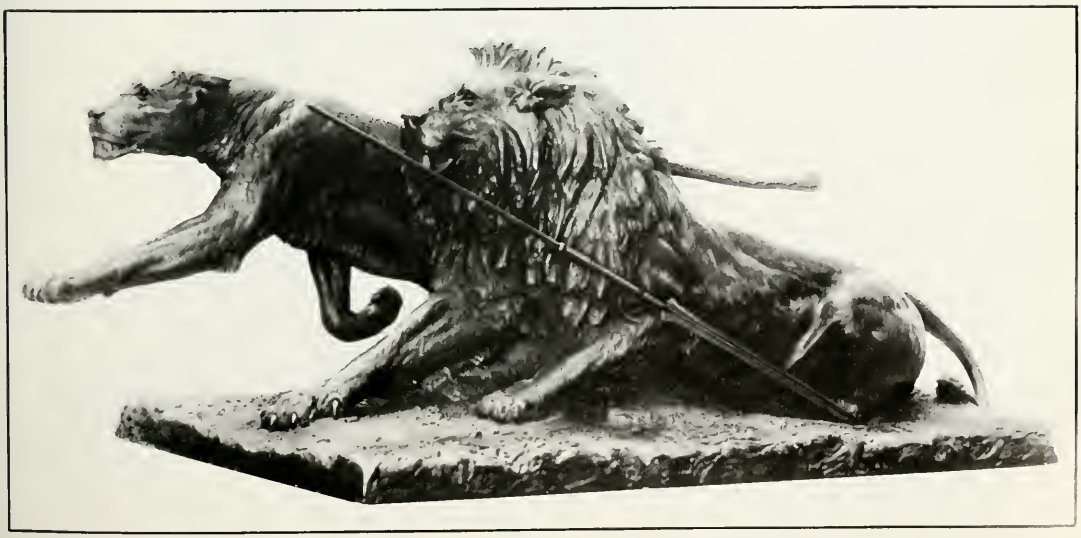
another of softer wood, produces fire through friction. Charcoal is then made, and in a crude retort of clay he smelts the iron ore. On a block of granite serving as an anvil, with a smaller stone as a hammer, he fashions crude hammers from the iron. With these as his only tools he shapes a spear which is to be sharpened finally on native stones. Thus he makes a beautifully balanced weapon, with which he goes forth to kill the lion that has raided his flocks and herds. He takes a great pride in the achievement, for he will make a headdress from the mane which his exploit entitles him to wear. This badge of distinction will forever command the respect of his fellows.

When lions are to be killed, as they must if civilization is to replace primitive life, the most humane method yet devised, as well as the most sporting, is that of spearing. The time elapsing between the first spear thrust and the end may be counted in seconds. There is small chance of the lion's escaping to die a lingering death from his wound, as so often happens when he is hunted with guns. If there are two or three natives together, it is reasonably certain that they will come out of it without a scratch. Shooting is not nearly as safe for the hunter. Moreover, spearing involves a fair combat between man and beast.

In the spring of 1910, after several strenuous months on elephant trails in Uganda, I went back to the Uashin Gishu Plateau for a lion hunt with Nandi spearmen. I had no difficulty in securing one hundred men, for they were to be paid and fed for playing the game they loved. In the twenty days devoted to the work there were many tense and thrilling moments. My band of sportsmen killed ten lions and five leopards. Only two men were injured. The first day out a leopard was surrounded in a patch of bush, and while I waited in the open for what was supposed to be a lion—as it should be driven out in front of the camera before being speared—there was a great commotion. A few minutes later the beaters brought out a leopard with sixty spear holes in his skin and one of the Nandi with his scalp hanging over his eyes. The leopard had refused to be driven and had given a good account of himself. Prompt surgical attention to the wounded Nandi resulted in a speedy recovery.

Two days later a single lion was brought to bay in a strip of forest and speared before the camera could be brought up within view of the direction he unexpectedly took. Then for several days we hunted for lions without success until one morning, as the white members of the party were riding along in front and were just entering the bush that fringed a donga, we met face to face a band of lions that promptly took to cover as the alarm was given. In whatever direction a lion tried to escape a spearman bobbed up in the grass in front of him. The lions were forced to fight it out. Pandemonium reigned as the Nandi, shouting, and lions, grunting and growling, ran helter-skelter among the trees and high grass while I tried desperately to find a vantage for the motion picture camera. When it was all over, and we took stock, we found that we had the memory of a few glimpses of tawny skins but no pictures. There were, however, three lions to be skinned, and we had reason to believe that two had escaped.

Again as we rode beside a wooded donga a boy in front of me held up his hand in warning. As I swung off my horse a lion grunted close by, and as I was adjusting the camera a lioness came straight toward me, within ten feet, swerved and passed, then turned and plunged into the donga—all before the camera could be adjusted. Then I responded to a call from the left flank and hurried the camera to a point overlooking the part of the donga where a lion had taken cover in the high grass at the bottom. I had begun cranking the camera when the first spear was thrown. The spear hit the target, other spears followed quickly, and the lion never left his tracks. It was all over in less time than it takes to tell it. The film shows not only the falling spears but also the



movements of the lion in the grass. Immediately I was summoned to another group of spearmen who were holding another lion at bay until I could have my camera brought into position. Again a film record was made.

As we were making camp near by and the two kills were being brought in to be skinned, the Nandi brought in a third lion from down the donga. We learned that one of the spearmen, a youth who had been loitering behind when the lions were located, had been charged by a lioness as he was running past her. He had killed her, but she had bitten his leg before she died. The boy's wounds were not serious and he was hunting with the rest a few days later. He was now entitled to wear a lion's skin headdress since he had killed a lioness alone.

It was perhaps a week later that we were riding along the slope of a hill overlooking a valley when I detected a moving object in the grass at the bottom of the valley. We soon found that five lions were leisurely making their way up the opposite hill. Four of them succeeded in reaching the bush along the banks of a small stream on the other side of the hill before being brought to bay by the Nandi. One had turned back and was rounded up in a small patch of high grass near the crest of the hill. This was a splendid chance for a picture, for the men could have held him there almost indefinitely as they awaited the camera.

As I was breathlessly adjusting the awkward thing, one spearman, more excitable than the others, threw his spear. Of course, the rest followed and the job was finished before the camera was ready. Again three of the five lions had been taken, but no film. This was our last encounter. I was not pleased with the results, as the film seemed an inadequate record. Had I, however, at this time planned to make a sculptural record of lion spearing, I should not have regarded the film as unworthy, for the pictures and other data were highly valuable for that purpose. □

"Chrysalis," a 1924 bronze by Carl Akeley

A special exhibit o
materials on Car
Akeley, primarily
photos and publica
tions, is now on view in
the Field Museum
Library, open 9:00 a.m
to 4:00 p.m., weekdays

CARL AKELEY
as
Naturalist, Taxidermist, Inventor

Akeley's museum assistant explains how the fighting bull elephants in Stanley Field Hall were mounted more than 70 years ago

AFTER CARL AKELEY'S DEATH in 1926, C. L. Dewey, who had worked as his assistant from 1903 to 1908, wrote the following tribute, which appeared under the title "My Friend Ake," in the December, 1927, *Nature Magazine*:

The number of boys, girls, men and women who have wanted to work for and with Akeley, is unbelievable. Love of Nature, love of the outdoors, and love of animals were the first things that Akeley inquired about of the applicant. Then he wanted to know what you knew about the job that you wanted, and this generally led to downfall. I came out of the tall sticks to ask Akeley for a job, and when I pleaded ignorance of any knowledge whatsoever of the workings of taxidermy and kindred arts, he said he would give me the job if I was sure that I knew nothing about it. He had tried for some years, he said, to break in a young man for the particular job that he thought I might fill, but they all knew so much about the work they couldn't learn anything from him.

Akeley [illegible] 1906 [illegible] during Br[illegible] African E[illegible]

The first trip afield that I made with Akeley was into the lake region of northern Illinois to collect material for the projected Illinois Bird Room for the Field Museum of Natural History, then known as the Field Columbian Museum of Chicago. This plan of presenting the birds of Illinois in their natural surroundings, with photographically reproduced colored transparent background and complete data pertaining to each species, though shelved when partly finished, was the beginning of the plan which has consummated in the projected Roosevelt African Hall in the American Museum of Natural History in New York City, and for which Akeley gave his life.

In the field Akeley was supreme. He knew every species and sub-species of birds, just when and where they nested, could tell from even a partly-constructed nest what species was building. He knew the habits, food, nest sites, songs and, it seemed to me, even the thoughts of the birds and animals. We were collecting material from which to reproduce the natural surroundings of bird homes. This included making plaster casts of leaves and flowers, taking color notes, and other detailed work. Akeley knew just what colors of oil paint and what proportions to use to reproduce in colored wax the first light yellow green leaves of the early-leafing willow as a setting for the early-nesting yellow warbler, or the dark green oak leaf of the mid-summer nesting cedar waxwing. Nothing escaped him to the last detail, nothing was too difficult if it accomplished the desired results....

The papier-maché manikin method developed by Akeley through years of experimenting worked wonders with mammals such as deer and antelope groups, but was not practical for the immense size of a bull elephant. Many years ago Akeley had mounted, or stuffed, as it was termed, Jumbo, the circus elephant that tried to butt off the track a full sized locomotive and gave up his elephantine ghost in the attempt. Since then Akeley had developed in his mind a complete method of mounting one of

these huge beasts and the two enormous skins and skulls which he brought back from Africa in 1906 gave him ample opportunity to execute his plan. He first modeled in clay accurate replicas in miniature exactly one-twelfth size of the original animals, working to measurements and photos taken in Africa immediately after the elephants were shot. These were modeled as two fighting bulls, one single-tusker attacking the slightly larger bull, standing on three feet, one foot raised slightly off the ground, with tusks and trunk raised in the air nearly seventeen feet high. Working to this model we laid out with crayons full size on the studio floor, the outline of one of pachyderms, and inside this outline a back bone, neck and legs of structural steel, much as if we had intended to build a steel bridge. The back bone and corresponding members in the elephant's "tummy" were made of two four-inch steel channels, back to back, separated by means of two inch by four inch lumber, about thirty inches long, spaced about two feet apart and standing vertically like spines in some pre-historic dinosaur. Heavy bolts passing through both channels between each pair of uprights clamped the uprights securely, and permitted adjustments for working out details in contour. The ribs were worked out with curved steel angles of suitable weight.

Akeley modeled the head full size in clay over the immense skull with the huge tusks in position. A plaster cast in four sections was then made of the completed model. This cast, when hardened and removed, served as a mold or form into which was fabricated a light steel frame-work following out in detail the plaster mold. This steel-head-skeleton was then added to the body structure and in this manner the complete steel skeleton was constructed. The body or shell was formed of one inch square wire loosely woven so that it was capable of warping without buckling. The ears were made of lighter wire mesh over a light steel frame, as was the trunk, two small steel pipes running the full length of the trunk, raised high in the air. Over this entire steel and mesh frame was plastered by hand a mixture of plaster of Paris and tow, this being like unwoven rope, to a thickness of about one inch.

Akeley's fighting bull elephants, secured in Africa in 1906 and now on view in Stanley Field Hall.

Lower left: Akeley relaxes at day's end.

When this was completed, there stood an elephant minus his hide, twelve times the size of the working model and exactly his counterpart as he roamed the slopes of Kenya for probably more than a century.

It is a problem successfully to bring out of Africa the skin of an elephant in condition fit to mount. These huge hides are from an inch to two inches in thickness when removed from the carcass. They are cut in five or six pieces and immediately work must be started in the dense wet bamboo forests to pare the skin down by hand to a thickness of about one half inch. These are then heavily salted and loosely rolled together, bound securely in native cloth, and made ready for transportation many miles to the nearest point where oxen could be secured. Each section would weigh several hundred pounds and be carried by eight or ten native porters for the magnificent sum of thirty cents per month —and grub.

To mount "green" skins is not practical, so Akeley developed a special method of tanning never before used. As a result the elephant skins were turned into a high grade leather hide presenting the same exterior as worn by "Tembo" in his native haunts—sparse, stiff hairs, wrinkles, warts, tick-holes and all. The big sections of skin were first laid in their proper position on the finished manikin and by means of huge syringes somewhat like the present day auto grease gun, a mixture of hydrated plaster of Paris and glue was shot in under the skin through small slits easily closed, and then the skin

Akeley was fortunate to emerge the victor in his fight with the leopard. Weaponless, he subdued the 90-pound cat by thrusting one hand down its throat and choking it with the other.

modeled into shape with numerous wrinkles as in actual life, the plaster of Paris and glue hardening and holding the skin in exact position. Akeley did practically all of this modeling with his own hands. The edges of each section were then sewed together with hidden stitches and filled with colored beeswax so that when finished even the most critical eye could not detect the seams. As a rural visitor once said, "That old bull looks just like he growed into his hide."

There have been many stories told as to the origin of the cement-gun, the invention for which Akeley received the Scott Medal issued by the Franklin Institute of Philadelphia. The generally accepted story is that Akeley developed this for use in constructing plaster manikins for huge mammals such as elephants and rhinos, but this is not true. At no time did Akeley seriously consider this, but it made an acceptable story so he let it go at that.

The Field Columbian Museum of Chicago in 1907 occupied the old Art Building built in 1892 for the Chicago World's Fair, constructed of brick with plastered exterior, the plaster of Paris or staff columns and trim. It presented a sorry spectacle in 1907. One day F. J. V. Skiff, the Director of the Museum, was in Akeley's studio where we were mounting the pair of African elephants, now the center of all exhibits in the new Field Museum. I was at the time using an enlarged handmade atomizer operated by compressed air, to paint some imitation rocks for another group under construction, using a combination of thin colored plaster of Paris. Mr. Skiff, who generally brought all of his troubles to Akeley, was talking about the complaint that he received from the South Park Board regarding the condition of the exterior of the Museum. He said that no painting or plastering contractor could be found who would take the chance on the job, and while talking he suddenly said, "Ake, why can't you and Dewey make a big machine like that squirt-gun that Dewey is using, and paint this old shack with plaster of Paris?" It never took much of a hint to start Akeley off on a new idea, so at once we started to develop a big "squirt-gun." These walls consisted of plaster, brick, concrete, wood, tin, iron, copper, tar paper and about everything that could be assembled together on one building, and as this structure covered several acres there was ample space for a generous assortment.

The method of mixing plaster and water in a container under pressure and then spraying out in a hydrated state, worked fairly well when only a few feet of hose was used, but when this was attempted with the machine on the ground and the nozzle operator fifty or seventy-five feet up on a swinging scaffold, the plaster began to set in the hose after a few minutes' operation and soon the hose plugged tight. We then worked out a method of shooting hydrated plaster through the hose for a few minutes and then by means of a three-way valve we shot through water to clean out the hose, and then back to the hydrated plaster again. This, however, was a very messy operation and was abandoned. Then one morning Ake came in and said, "We're on the wrong track. What we want to do is build a machine to handle dry plaster. Shoot it through a hose to a nozzle where it will mix with water coming to the nozzle through a separate hose, the volume of water to be controlled at the nozzle with water pressure greater than the air pressure carrying the plaster, and have them mix partly in the nozzle and finish up in the air and on the wall. I have an idea for a nozzle, and it's up to you to build a machine to feed plaster evenly." In less than two weeks or, to be exact, on June 24th, 1907, the "cement-gun" was put in operation and worked about an hour before it broke down, but this was long enough to prove that the theory of hydrating plastic material in transit was practical, and resulting from this were basic patents which have never been successfully contested....

OUR ENVIRONMENT

Star Burst May Have Wiped out Dinosaurs

A star exploding 65 million years ago may have sounded the death knell for dinosaurs, according to researchers at the University of California. Limestone samples from a thousand-foot-high road cut in Italy indicate that the extinction of the huge reptiles coincides with a twenty-fold increase in the amount of iridium. Iridium is an extremely rare metal on Earth, but is believed to be about three thousand times more common in the rest of the solar system. The high concentrations discovered, therefore, are thought to have come from an outside source such as an exploding star, which would also produce deadly amounts of cosmic radiation. Dinosaurs, with their slow reproductive rate, would have been especially harmed, making room for their more adaptable competitors, the early mammals, to evolve.

Atlantis Revisited?

Underwater photographers from the Soviet Union, reports *Conservation News*, think they may have discovered the lost, mysterious continent of Atlantis described by Plato more than 2,000 years ago. Russian oceanographers, including a scientist specializing in unexplained maritime phenomena, have been interpreting eight underwater photographs taken from a diving bell near the island of Madeira, southwest of Portugal. They have found ruined, flattened remnants of stonewalls or bridges and stairways at the exact spot indicated by Plato in his writings. The scientists believe that a chain of flat-topped mountains now 100-200 meters below the surface are geological evidence that Atlantis may have been more than a myth—that it actually did sink into the sea due to upheavals along the ocean floor.

Salmon Returned to Thames

The first run of salmon into the Thames River for 140 years is the aim of a project currently under way in Britain. Late last month some 50,000 one-year-old salmon were released into the Thames, and fisheries authorities hope that after a sojourn at sea these fish will return to the river as adults to spawn.

The Thames was once famous for its salmon fishing. But the Industrial revolution put an end to that. Now tests on the quality of the river's water indicate that the clean-up campaign of recent years has reduced pollution levels to a point where salmon may once again be able to live, and breed, in the Thames.

Lasers and Computers Used in Bird-Power Line Collision Study

Using a laser beam and a compact computer, the U.S. Fish and Wildlife Service (FWS) has begun a project that will attempt to simulate the effects a high-voltage power line might have on birds. Each year, it is estimated, thousands of birds die or are injured when they strike power lines. Until now, wildlife biologists could merely speculate about the magnitude of this problem, but by employing space-age technology new information is close at hand.

A power transmission line located in an area with a diversity of wildlife and across a major migratory route can prove to be a major obstacle. A variety of birds have been injured or killed from striking fixed objects such as power lines. Such occurrences have been documented at several locations and are not merely isolated situations.

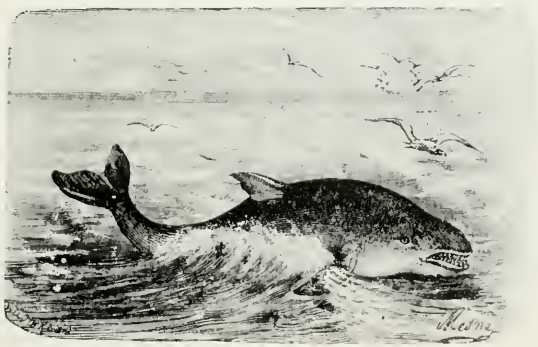
"Bird strikes with fixed objects such as power lines are quite common," according to Carl Korschgen, FWS biologist and coordinator for the project. "No bird species seems immune to collision with power lines. Songbirds, eagles, ducks, and geese; all sorts of birds have been known to strike power lines."

Korschgen gave the grisly details about bird strikes: "The effects on birds can be davastating; what we are talking about is decapitation, broken wings, broken necks, and other violent after-effects. These birds are traveling 40 to 70 miles per hour and any contact with a fixed object is going to kill or maim."

The laser beam will project a two-inch diameter beam of light across a 3/4-mile stretch of the Mississippi River where bird movement during migration can be quite heavy. The beam is coupled to a computer that will record the total elapsed time the beam is interrupted when a bird or other object passes. This will provide researchers evidence regarding the size and type of bird passing by. The computer will provide a readout every 10 minutes as well as a total readout since the project began.

The interruption of the laser beam also triggers the shutter of a camera with a 1200 mm lens focused to record on black and white film any object passing through the beam. The unit is quite sensitive and could be triggered by falling leaves and other objects, but the film record will help to clarify this possibility. The laser beam projection is positioned 45 feet above the water surface. The unit is manned part-time, but is capable of remote operation for periods up to seven days. The laser beam poses no known threat to birds as they pass through the beam. It is a low-powered laser system similar to devices used in commercial telecommunications systems.

Invisible to the human eye, the beam will simulate the effects of a power line under the "worst of conditions," such as dense fog, which makes birds highly vulnerable to striking fixed objects. "Weather does play an important part; under certain conditions and migration



patterns, birds will fly lower and collide more often," Korschgen said. Korschgen pointed out that birds can and will strike power lines under ideal weather conditions.

Open water crossings in important flyways are of particular concern to biologists, but the data from the project will be applied to all flyway corridors and critical areas where power lines may be constructed. According to FWS officials, the technology and techniques learned from this project will allow biologists to get in on the ground floor of powerline project planning to alleviate possible problems before they occur. Biologists are hopeful that they can monitor bird activity before, during, and after construction and learn a great deal about the sensory perception of birds. The four-year study will be a joint effort by the FWS, the National Aeronautics and Space Administration (NASA) and Northern States Power Company.

Chemical By-Product of PCBs Found in U.S. Fish for First Time

Little-known contaminants called polychlorinated dibenzofurans (PCDFs) have been detected in fish from U.S. waters for the first time, an international team of scientists recently reported.

PCDFs are chemical by-products of widespread, toxic industrial chemicals known as polychlorinated biphenyls (PCBs). They were detected by David Stalling of the U.S. Fish and Wildlife Service's National Fisheries Research Laboratory in Columbia, Missouri, and Ralph Dougherty of Florida State University, Tallahassee. Christopher Rappe of Sweden and Douglas Kuehl of the Environmental Protection Agency (EPA) are also collaborating in the investigation.

Although the occurrence of PCDFs in the aquatic environment in the United States has been suspected previously, this is the first time it has been confirmed. PCDFs were detected in carp, catfish, lake trout, and coho salmon collected in areas of the North Central and Northeastern United States where PCB pollution historically has been a problem. The detection was possible now only through the scientists' use of sophisticated new techniques of negative-ion high resolution mass spectrometry.

Stalling and Rappe emphasized that they are not yet certain whether the contaminants in their samples are hazardous to fish or other aquatic organisms. Some PCDF compounds are considered far more toxic than the parent PCB — a few up to 500 times more toxic than the most potent PCBs. Studies at the National Institute of Environmental Health Sciences and several universities have shown certain PCDFs to be highly toxic to guinea pigs and rats.

"There are 135 PCDF compounds," Stalling said, "We have not yet identified the individual chemical structures of the PCDFs in our samples, so we cannot be sure which of the 135 are present or whether they might have toxic effects."

The extent of PCDFs presence in the environment is not known. It is known, however, that the parent PCB compounds have been used in a wide variety of industrial equipment and products over the past 50 years. Use of PCBs is now tightly controlled by the EPA through the Toxic Substances Control Act of 1976. PCDFs are known to be produced by oxidation of PCBs and thus can be formed when materials containing PCBs are burned, especially at low temperatures.

"We know that very high temperature burning, if done for long enough, will completely destroy PCBs," Stalling said. "However, Rappe has demonstrated that low temperature combustion in the 400°-to-600° C-range can convert 25 percent of PCBs to PCDFs.

Stalling and Rappe are currently working to identify the chemical structures of the PCDFs in their samples. "Once specific PCDFs in fish are identified," Stalling said, "laboratory scientists will have a better idea how they are formed and which structures should be tested for possible toxic effects in fish and other aquatic organisms."

God's Dog Moves East

The Navajo call him "God's Dog," echoed in his scientific name, *Canis latrans* ("barking dog"). However, his more romantic common name derives from Coyotl, sacred god of the Aztecs. He is the coyote, that indispensable part of a Western desert night. However, this adaptable creature has now made his home in the East.

Since the turn of the century, the coyote has pushed eastward from the Great Lakes region to reach the Atlantic. Moving southeastward from Ontario, it has become firmly established in northern New England, and been sighted in every state northeast of Virginia. Filling in part the predatory role of the extinct eastern timber wolf, its expansion of range parallels the return of forests to more than 80 percent of Northern New England.

Eastern coyotes were first taken in New York in 1925, New Hampshire in 1944, Connecticut in 1956, and New Jersey in 1958. In northern New England, it is now a relatively common animal, with over 300 killed by hunters, trappers, and autos in Maine alone during 1977. Although more rare in southern New England and the mid-Atlantic states, it has become a breeding resident in forested, less populous areas.

What exactly is this new creature prowling the Northeastern woods? Information on its ancestry has come from cranial studies and observations of growth and behaviorial development patterns. Notions of werewolves aside, it first was proposed that the eastern coyote was a "coy-dog," a fertile hybrid resulting from the mating of a coyote and a domestic dog. However, not showing the extreme variability exhibited by coyote-dog hybrids, these wild canids breed true, their offspring uniform in looks resembling the parents. Eastern coyotes and coy-dogs also have distinctly different behaviors. Behavioral and physical differences between western coyotes and the eastern variety have also discounted the theory that eastern ones are simply oversized western ones.

Eventually, its larger size and howling pattern led biologists to suspect that this wild canid might have acquired wolf antecedents during its relatively slow eastward movement through marginal

wolf range in northern Minnesota and southern Canada. In 1971, biologists at Harvard University verified the wolf's genetic influence through skull and tooth structure analysis. "This animal combines the crafty cunning, prolificacy, and adaptation of his western cousins with extra size and strength contributed by the wolf genes that course through his blood," writes Jerome Robinson, *Sports Afield* editor.

Behavioral and physical data from a 1960s study by New Hampshire biologists Walter and Helenette Silver also favored acceptance of a predominantly western coyote ancestry for New England's wild canid, with acquisition of some dog or wolf genes. The Silvers' conclusion: "Despite evidence of hybridization at some distant time, it is now established as a true breeding form." They suggested it be considered a form of coyote, be designated *Canis latrans* var., and be called eastern coyote.

The eastern coyote's size falls between the western coyote and the wolf. Overall, it more closely resembles the coyote, but the wolf portion surfaces in its rounder, more ungainly paws, broader muzzle and nosepad, greater height and weight, and darker coat. Males average 31 pounds and females 28 pounds—50 and 70 percent larger respectively than their western relatives.

The Silvers found that coyote-like behavior predominated, including such factors as early establishment of a dominance hierarchy, aggressiveness, spring whelping, and male care of young. Eastern coyotes shake, scratch, and groom less than dogs, wave instead of wag their tails, and are attracted to perfume (as are wolves, but not dogs!).They begin howling in unison at age two months, mainly after sunset and less often during the winter, in a voice pitched between that of wolves and coyotes.

Eastern coyotes breed once a year, during February, with their 63-day gestation period ensuring that pups are born during warmer weather. Litter size ranges from four to ten, with six or seven average. Females make only rudimentary dens, often scraping a hole in the snow under a fallen log. Males share in raising the litter, which is weaned in July, with families breaking up in the fall. Coy-dog hybrids, meanwhile, show a three-month shift in their breeding cycle. Because hybrid males do not help raise young born in a hostile January environment, the pups have little chance of survival.

In response to hunter concern that coyotes could adversely affect deer herds, studies have emphasized food habits. Stomach content analyses have shown the animals to be adaptable, opportunistic feeders that eat whatever is seasonably abundant. Because they seek the most available food source, coyotes serve as both predators and scavengers.

Many studies show bias because samples were collected in the fall when hunter-killed deer are readily available. "Stomach contents show only what an animal has eaten, not necessarily what it killed," warns New Hampshire biologist Joseph Wiley. The presence of maggots and carrion beetles in much of the deer consumed indicates that it was in carrion form. Here's what eastern coyotes have been found to eat: snowshoe hare, squirrel, raccoon, opposum, woodchuck, skunk, beaver, porcupine, mouse, mole, vole, birds, deer, cat, rabbit, insects, grass, hay, leaves, pine needles and cones, apples, raspberries, blueberries, grapes, corn, wood chips, garbage, plastic bags, paper, and sand! Approximately one-fourth of the stomachs in each study were empty.

Deer is a major staple after the hunting season, when carrion and hunters' cripples are easy pickings. "None of the information gathered from the Maine deer harvest shows that predation is the limiting factor controlling deer numbers throughout any management unit in the state," reports the Maine Department of Inland Fisheries and Wildlife. The New Hampshire Fish and Game Department concurs, stating that this new predator is not a serious threat to state game populations, with reported annual deer kill by coyotes less than one percent of the non-hunting kill (vs. 14 percent by domestic dogs and 67 percent by cars).

In fact, it's actually the other way around: coyotes are themselves limited by the amount of vulnerable prey. According to Robinson, their expansion throughout the Northeast indicates an excess of prey not being taken by man or other predators exists for coyotes to exploit.

This is not to say coyotes never kill deer. Packs can bring down deer on ice, downslopes, or on open ground. According to Maine biologist Henry Hilton, main effects on deer occur between January and March, when deer are weakest and most vulnerable, and nutritional needs of pregnant coyotes greatest. Single coyotes often unsuccessfully chase deer, but during the breeding season when they form small packs, they are more successful. Winter-starved deer restricted to yarding areas by deep snow are often the most vulnerable and available food in March.

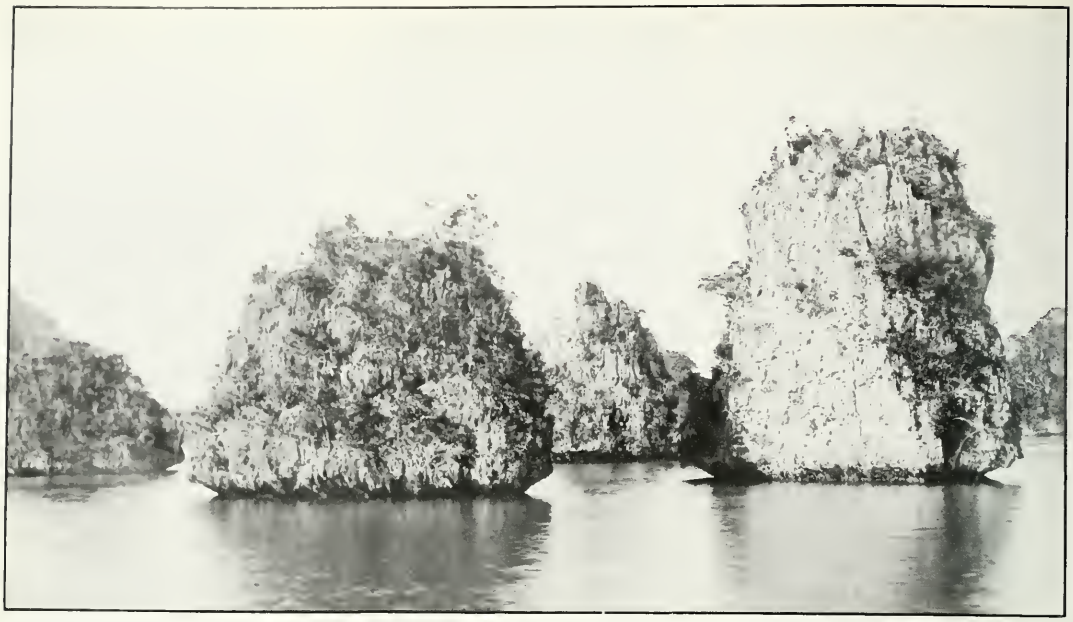
State game managers monitoring effects of coyotes on other wildlife are not too concerned. In fact, "Many knowledgeable people think the New England deer herd could only be benefited by the return of an effective wild predator...who would eliminate the weak, diseased, and genetically abnormal," writes Hope Ryden in *God's Dog*. "By weeding out the 'culls' of the animal world and leaving the best of their prey

species to reproduce, coyotes help maintain healthy wildlife populations," writes Wiley, who continues: "Evidence is heavily against the coyote being a significant predator, especially on deer, and in favor of its being of considerable ecological value in controlling vermin and insects."

Local response to this new resident has varied, reflected in the legal status accorded the eastern coyote. The animal is fully protected in Massachusetts and New Jersey, but in New Hampshire, Vermont, and Maine, it's open season year-round—coyotes may be taken by any legal means at any time in any number.

When the first specimen was shot in Maine in 1972, "People came from miles around to revile and spit on its remains," reports Ryden. While a bill to introduce a bounty was defeated, "This victory merely prevented a money reward from becoming an added incentive for those who wished to destroy the animal." In 1961, the New Hampshire legislature, lacking a better definition of the species, passed a $10 bounty on "timber and prairie wolves." The law was amended four years later after "People began to shoot their neighbors' dogs and present the bodies for money," Ryden adds. Because its pelage ranges from dark gray to red brown, the eastern coyote is not especially sought after as a fur.

An old Indian legend states that the adaptable coyote will be the last animal on Earth. Hopefully, some living arrangement can be reached between Northeastern residents and the eastern coyote so this prediction will not be proved false.—*Susan M. O'Connell, National Wildlife Federation*



South Pacific Islands such as these, clearly hostile to human habitation, are difficult to reconcile with the idea of paradise.

National Endowment for the Humanities (NEH) Learning Museum Program Continues with *SOUTH SEAS ISLANDS: PARADISE AND PERDITION*

by *Anthony Pfeiffer*
project coordinator

THE SOUTH SEA ISLANDS, to many of us, are paradise on earth: romantic islands characterized by harmony, peace, innocence and situated in balmy tropical splendor. As James A. Michener wrote, "...Polynesia's influence on world thought is far greater than its size would warrant. Musical names like Tahiti, Rarotonga, Bora Bora carry an emotional freight to all cold countries of the world...."

Beginning February 8 you have a chance to forget the snow, rain, and cold winds of Chicago's winter without having to journey to the South Seas. To establish the mood, "Paradise Explored: Films of the South Pacific," is offered in Field Museum's latest Learning Museum Program. This festival of film begins with a Friday night screening of the 1958 film adaptation of "South Pacific," Rodgers' and Hammerstein's Broadway musical. The songs and the events depicted call forth our popular stereotypes of the Pacific-as-Paradise — notions which are revealed as one-sided, as the film festival runs into its second day. Six subsequent hours of film concern the early exploration of the Pacific, island life as it once was, and the complex impact of the modern world on native lands. We see that, like anywhere else in the world, the best and the worst in human nature is to be found in the Pacific. Along with the pristine grandeur of palm-shaded beaches and seductively appealing life styles, there is also cannibalism, isolation, disease, and famine. We recognize perdition as much as paradise.

Michener puts the paradise-and-perdition contrast with reference to a particular island group:

> *If paradise consists solely of beauty, then these islands were the fairest paradise that man ever invaded.... But if the concept of paradise includes also the ability to sustain life, then these islands... were far from heavenly.... Of all the things that grew on their magnificent hillsides, nothing could be relied upon to sustain life adequately.*

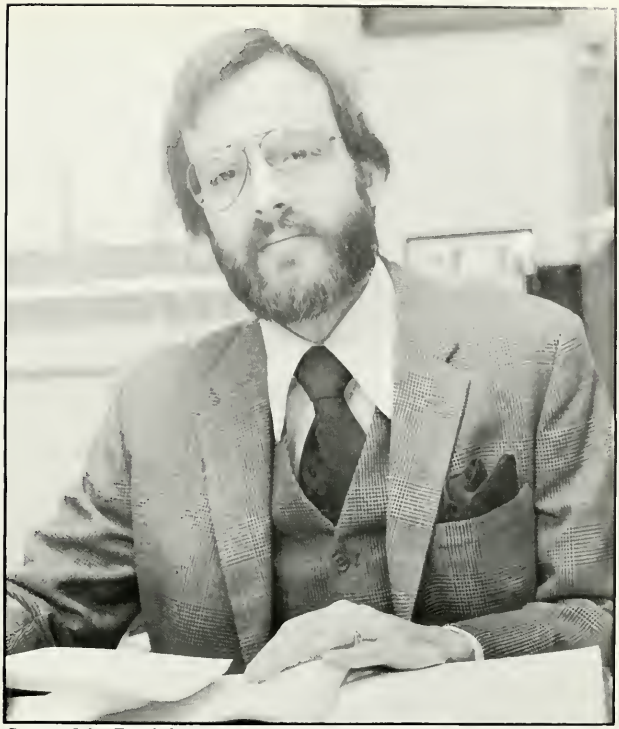
Elsewhere Michener comments, "You would have to call it paradise even though most of you may never want to see it again."

The festival of film leads into a lecture course taught by Joyce Hammond, whose field

work in Oceania has included French Polynesia, the Marshall Islands in Micronesia, and a ten-month stay among the Maori of New Zealand. Ms. Hammond begins the course by considering the European exploration of the South Sea Islands. The course examines who the explorers were, where they went, why they stopped at some places and not at others, as well as what discoveries and tales of adventure they brought to the world. Thousands of islands are almost lost in the incredible desolation of 65 million square miles of sea. The Pacific Ocean covers one-third of the earth's surface. Its peaceful name is a glaring misnomer. Darwin depicted it as "all-powerful and never tiring" and as "a tedious waste, a desert of water."

A rich cultural heritage of art and literature has nurtured our myths of paradise. The *Bounty* Trilogy, *The Swiss Family Robinson*, and *Moby Dick*, to mention a few classic books, lead us to associate the Pacific with high adventure, nobility, and romance. And yet *Lord of the Flies*, William Golding's novel of ever-so-civilized English schoolboys gone savage, is also set in the Pacific. The class probes contrasting views of the South Seas and follows Michener's suggestion that studying Gauguin's vivid imagery and use of color is an incomparable preparation for Polynesia.

Guest lecturer John Terrell, associate curator of Oceanic archeology and ethnology at Field Museum, speaks about the true discoverers of the Pacific, the islanders. Thousands of years before Europeans explored the oceans, the forbears of these islanders pioneered the settlement of the Pacific. We learn the prehistory of paradise: what scholars know of its first founders and the



Curator John Terrell has spent two years preparing the "Patterns of Paradise" exhibit, opening March 6.

Ron Testa

The Pacific islanders were a bold, seafaring people who depended on navigational skills for fishing and trade as well as for long, risky voyages to colonize unknown areas.

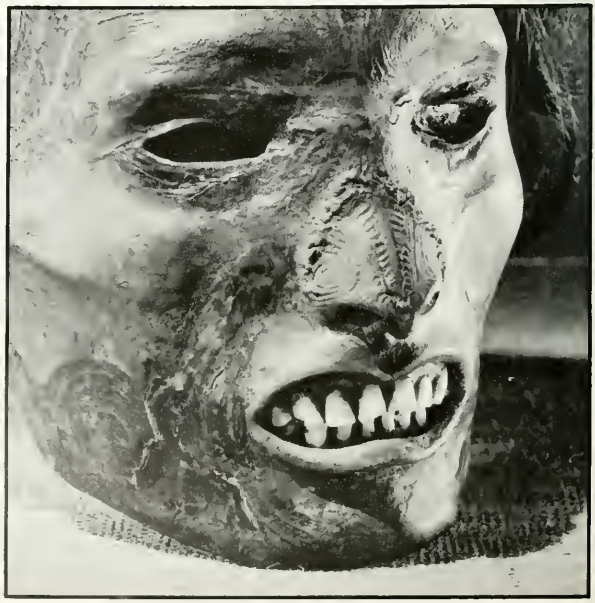
The eyes and demeanor of this lovely maiden suggest innocence and perhaps even free sexuality—images consonant with conventional views of Pacific-as-Paradise and commonplace in art and literature.

NEH Learning Museum at Field Museum

The NEH Learning Museum program is a three-year sequence of learning opportunities focused on the Museum's outstanding exhibits and collections and designed to give participants an opportunity to explore a subject in depth. Each unit of study consists of one or more special events, a lecture course, and a seminar of advanced work. Special events are lectures by renowned authorities or interpretive performances and demonstrations. Course members receive an annotated bibilography, a specially developed guide to pertinent museum exhibits, study notes for related special events, and access to select materials from Field Museum's excellent research library. In-depth, small group seminars allow more direct contact with faculty and Museum collections.

kinds of hardships they faced. As science writer John Pfeiffer has described their journeys: "People moved from island to island as their landlubbing ancestors on the continents had moved from valley to valley in a process born of adventure, necessity, and, sometimes, desperation."

In addition to his research, Dr. Terrell for the past two years has been planning and organizing a major exhibit, "Patterns of Paradise," which opens at Field Museum on March 6. The exhibit is about the peoples of paradise, told through the medium of their surviving handicrafts — most notably *tapa*, or bark cloth. Dr. Terrell and co-worker Anne



The sordid side of the Pacific is brought to mind by this trophy head from New Zealand (cat. 273944) with horridly bared teeth. But because it conflicts with dreams of romance and paradise it is a type of image that we tend to neglect.

Palms and simple frond-roofed huts exemplify tropical life in parts of the South Seas.

Leonard, Field Museum researcher in anthropology, have assisted in integrating portions of "Patterns of Paradise" with the course and in suggesting course resources.

"South Sea Islands: Paradise and Perdition" goes on to look at the diversity of Pacific environments and the correspondingly diverse human ways of living. Some islands are huge, others are small and exist in chains of coral-capped volcanic outcroppings, still others are tiny specks of land. Some islands hosted important chiefs whose wealth was flaunted in impressive mounds of yams and whose subjects were expected to prostrate themselves in the royal presence. Other islands were poor in crops and their inhabitants depended almost totally on trade to eat.

Finally, the course deals with a phenomenon experienced world-wide in the sixteenth, seventeenth, and eighteenth centuries — the collision of European-style civilization with the "backwards," "out-of-the-way," and "backwater" places of the earth. Such "contact" was perhaps particularly dramatic in the Pacific. In many instances, especially on the smaller islands, native populations had nowhere to escape the intrusive European presence. Some were removed wholesale from their lands, others were decimated by disease, and all were profoundly — usually negatively — affected. Missionaries, explorers, opportunists, criminals, and, most recently, warriors of the industrial age — all left their mark.

Museum collections are all that remain of many Pacific cultures; no longer do the young desire to learn the ways of their ancestors. The lecture course includes a guide to Field Museum Pacific collections. Field Museum organized and funded the Joseph N. Field South Pacific Expedition of 1909-13. Field Museum curator A. B. Lewis led the expedition and, after five strenuous years, returned with nearly 300 cases containing about 12,000 ethnological specimens — everything from shell beads to full-sized canoes. In 1958, the collection of the late Capt. A. W. F. Fuller was purchased. Although Capt. Fuller never saw the Pacific, he had amassed over a period of 60 years a collection of more than 6,500 specimens representing Pacific cultures. And, finally, Dr. Terrell arrived at Field Museum in the Fall of 1971 with seven tons of artifacts from Bougainville Island, in the South Pacific. Taken together, Field Museum collections of Pacific materials are among the very best in the world.

Students in "South Sea Islands: Paradise and Perdition" have the opportunity to enroll in a March 29-30 seminar devoted to the "Patterns of Paradise" exhibit. The seminar will feature an immersion in the art, craft, and life of the Pacific. Activities include a workshop in *tapa* making, films showing *tapa* and the peoples of paradise, lectures covering the ritual, utilitarian, and economic significance of *tapa* and a tour guided by Dr. Terrell of the "Patterns of Paradise" exhibit.

The *Courses for Adults* brochure features "South Sea Islands: Paradise and Perdition." February's *Calendar of Events* highlights the "Paradise Explored: Films of the South Pacific" festival. For further *Learning Museum* information, please phone 922-0733.

Fig. 1. *A portion of the excavations at Quseir al-Qadim, Egypt. Photo by Don Whitcomb.*

ROMAN BOTTLE CAPS

by Donald Whitcomb

OUR FIRST IMPRESSION of Quseir al-Qadim was hot and desolate. The gentle sound of the Red Sea waves, combined with the bright reds and browns of the mountains and the empty crystalline blue of the sky gave the ruins a stark beauty. Add a strong, dry north wind and the place had a distinctly parching effect on the casual visitor.

A similar response to this natural setting must have affected the Roman sailors and traders involved in the spice trade with India who settled here in the first and second centuries of the modern era. Leukos Limen, as this small port was then known, was just a short trip from the cities and towns of the Nile Valley (notably the gardens and temples of Luxor and Thebes). The most serious disadvantage was the scarcity of drinking water (the little water available was somewhat salty)—a mixed curse since the circumstance offered an excuse to import and drink frequently the fine Egyptian wines of Upper Egypt.

Thus, when we began excavating Quseir al-Qadim two years ago, we were hardly astonished by the great piles of sherds from Roman amphorae. Amphorae are 24-liter (6.3 gals.) jars used in ancient times to transport and store liquids and specially designed to fit together securely when stacked in a ship's hold. At first we assumed that these amphorae were simply being used for the transshipment of wine as part of the international trade of the Red Sea and Indian Ocean, but the numbers of "discarded bottles" in the trash heaps was too great —and then we began to find the "corks."

The typical Roman "cork," or "bottle cap," was a plaster plug with strings which passed under the bottom and up the sides. The strings were used to pull the plug from the bottle, somewhat like the ring on a pop-top can. The top of the plug, impressed when wet with a circular seal, was covered with red paint. This stamp impression in the wet plaster closing the amphora could have been used to indicate a number of things, such as ownership, vineyard of origin, or even vintage. The seal impression shown in figure 2 depicts in the center the uraeus, or Agathodaemon, an Egyptian symbol of good fortune. Around the perimeter is a Greek inscription which has been read by Roger Bagnall of Columbia University as a name: "Kere-onios, Freedman of the Emperor." It would appear that this man was in charge of a wine-producing establishment which shipped to our port of Leukos Limen. From other evidence, especially tax receipts, we know that large-scale wine production was an important industry in Egypt, including the Thebaid of Upper Egypt, during this period.

Donald Whitcomb is assistant curator of Middle Eastern archeology and ethnology. He is currently in Egypt looking for additional "bottle caps" (and other artifacts) at Quseir al-Qadim.

The bottle caps from Quseir always have Egyptian symbols in the center. Similar plaster or mud seals found in the excavations of Coptic monasteries and towns invariably feature the cross or some other Christian symbol in the center. All such examples are later than the first- and second-century seals we have found, confirming our impression that the Quseir seals are some of the earliest ever found in Egypt.

But where did the idea come from? The overall similarity of these seals to contemporary Roman coinage—bearing a center symbol and a legend around the perimeter—is readily apparent. Moreover, it had been the common practice throughout the Mediterranean world in Greek times for potters to place a small stamp on amphorae and other vessels. The Roman potters continued this practice by stamping mass-produced products such as amphorae, bricks, and tiles.

Recently I found such a brick stamp (*fig. 3*) in a Field Museum storeroom. As a brick stamp it is a common type with a dog or wolf in the center and the legend: *op(us) dol(iare) ex fl(iglinis) Domit(ianus) Maior(ibus)* "pottery product from the workshops of Domitian major." The stamp is part of a collection of antiquities from Alexandria, described in a 1907 study by Edgar J. Goodspeed, and dated to A.D. 161-193. This stamp, however, has several curious features: The brick has been carefully trimmed, leaving only the stamped section on top, and the bottom and sides have been covered with plaster (as can be seen in the photograph). The plaster on the bottom is shaped as if once positioned within a constricting bottleneck, suggesting that this stamped brick fragment was secondarily used as a cap for an amphora. Since the stamp was not contemporary with the reuse of the brick as a "cork," it could not, presumably, give the same identification or guarantees as the Quseir-type bottle-cap. The latter could become a symbol of ownership, of origin, of pristine contents, and of quality control associated with the authority of a responsible symbol; in short, the bot-

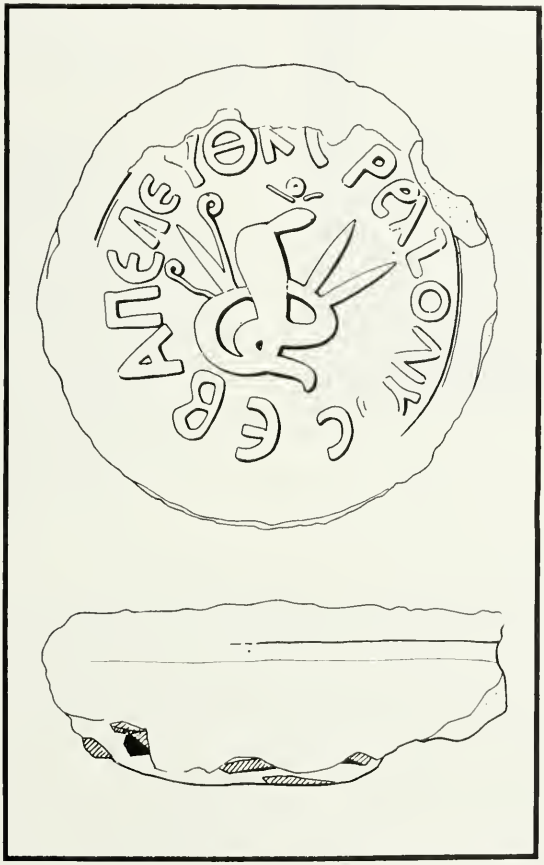


Fig. 2. *Drawing of plaster amphora "bottle cap" (top and side view) from Quseir al-Qadim.*

tle cap could become a trademark. But the Field Museum piece would seem to imitate the form without understanding the full purpose of the true bottle cap. Rather, it was a misconception of this new Roman commercial tool for standardization and systemization in mass marketing. Thus, there are, in the amphorae and their stoppers found at Quseir, the roots for today's highly disposable, two-liter plastic cola bottles.

The days of excavation at the ancient port of Quseir were hot and the task of recording the artifacts lasted well into the night. These evenings often ended with a round of very good Egyptian beer—which came in bottles with very interesting bottle caps. □

Fig. 3. *Above: stamped Roman brick in the Field Museum collection. Diam. 13 cm (5.1 in.), thickness 4 cm (1.6 in.). Cat. 26768.*
Fig. 4. *Right: cap from present-day Egyptian beer bottle*
Fig. 5. *Below: archeological student at Quseir al-Qadim amid thousands of amphora fragments recovered from site. Photo by Don Whitcomb.*

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Kimberley Snail Hunt—Round V, by Alan Solem: April 4
Legacy of Malvina Hoffman, The: Oct. 12
Metals and Man in the Prehistoric Midwest, by Thomas J. Riley: Feb. 4
Meteor-wrongs, by Edward Olsen: April 18
Natural History Museum, The: An Historical Sketch, by Cecile Margulies: Nov. 8
Observations on the Mutability of Time, by Alan E. Rubin: April 29
Of Automobiles and Meteorites, by Edward Olsen: Oct. 10
Of Land Bridges, Ice-Free Corridors, and Early Man in the Americas, by Glen Cole, Part I: Jan. 14; Part II: March 20
Red Square and Beyond, by Rev. Maurice J. Meyers: April 9
Remarkable Manatee, The, by Thor Janson: May 8
Ross's Rosy Gull, by Janette Neal: April 24
Second Annual Festival of Anthropology on Film: Nov. 18
Solar Eclipse of February 26, The, by Edward Olsen: Feb. 20
Taylor Camp, Hawaii, by Thomas J. Riley: June 18
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Tsavo Man-Eaters, The, by Lawrence Kolczak: June 14
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What's in a (Rock) Name?, by Edward Olsen: May 20
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Authors

Barrett, Mary (co-author): *Inro as Art*, May 12
Bronson, Bennet (co-author): *Inro as Art*, May 12
Cole, Glen: *Of Land Bridges, Ice-Free Corridors, and Early Man in the Americas*, Part I; Jan. 14; Part II: March 20
Cook, Stanton R.: *China: A Photographic Portfolio*, March 12
Deeds, Eric E. (co-author): *El Niño: The Catastrophic Flooding of Coastal Peru*, Part I: J/A 4; Part II: Sept. 4
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Karamanski, Ted: *The Borden-Field Museum 1927 Alaska Arctic Expedition*, Part II, Jan. 4
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Kolata, Alan L.: *Archaeology at the Top of the World*, Oct. 16
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Nabokov, Vladimir: Butterflies, April 10
Neal, Janette: *Ross's Rosy Gull*, April 24
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Pozorski, Michael G. (co-author): *El Niño: The Catastrophic Flooding of Coastal Peru*, Part I: J/A 4; Part II, Sept. 4
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———: *Kimberley Snail Hunt—Round V*, April 4
Terrell, John: *What Is a Curator?*, April 16
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———: *War and Peace—Pigeon Style*, March 6
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Keweenaw Peninsula: Feb. 5
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Peterson, Lorraine: March 4
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Plowman, Timothy:
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Ritchie, J.C.: Jan 20
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Roosevelt, Theodore: June 16
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Rutter, N.W.: Jan. 20

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Scanning Electron Microscope Adult Education course: Jan. 3
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January & February at Field Museum

(January 15 through February 15)

New Exhibit

"Image and Life: 50,000 Years of Japanese Prehistory." More than 100 artifacts, including ceramics, stone tools, weapons, and ornaments represent the Paleolithic, Jomon, Yayoi, and Kofun periods of Japanese prehistory. Never before shown outside of Japan, these artifacts range in age from more than 50,000 B.C. to the 6th century A.D. In Hall 27 until January 31.

Continuing Exhibits

"Art Lacquer of Japan." The Museum's newest permanent exhibit features more than 400 objects of exquisite lacquer art from 18th- and 19th-century Japan. The objects on display include finely carved and decorated *inro* (small sectional lacquer cases used to carry medicine), *ojime* beads, and *netsuke* (miniature carved pendants hung from silk cords). These objects were worn by Japanese men as symbols of wealth and status. Hall 32, second floor.

American Indian Halls trace the anthropological history and cultural development of the original Americans, from the time of their arrival on the North American continent (before 20,000 B.C.) to the present. Hall 5 contains a traditionally made Pawnee earth lodge — the home and ceremonial center of Pawnee Indians as it existed in the mid-1800s. Halls 4 through 10, main floor east.

The Hall of Chinese Jades contains beautiful jade art spanning over 6,000 years of Chinese history. An exhibit in the center of the hall illustrates ancient jade carving techniques. Hall 30, second floor.

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Tiahuanaco: Art and Empire in the Andes: Nov. 3
Tirol, Archduke Ferdinand of: Nov. 8
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Tiwanaku, Bolivia: Oct. 17
Toxic Substance Control Act of 1977: March 34
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Tsavo man-eating lions: June 14
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Umnak Island: March 25
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Valentini: Nov. 10
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Zaña, Peru: J/A 4
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Zorich, Diane: May 12

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January & February at Field Museum

(Continued from inside back cover)

Continuing Exhibits

"The Place for Wonder." This gallery provides a place to feel, try on, handle, sort, and compare anthropological and natural history specimens. Items from the People's Republic of China, and "Earthquake Charlie," the Museum's enormous polar bear, are some of the newest touchable items. Weekdays, 1 p.m. to 3 p.m.; weekends, 10 a.m. to noon and 1 to 3 p.m. Ground floor, near central elevator.

New Programs

"Paradise Explored: Films of the South Pacific." Planned in conjunction with the second Learning Museum course, this film festival examines the clichés, myths, and realities of the South Sea island culture. Rodgers' and Hammerstein's *South Pacific* is among the films screened at 7:00 p.m., Friday, Feb. 8, in James Simpson Theatre. The festival continues all day Saturday, Feb. 9. For further information, call 922-3136.

The NEH Learning Museum Program is a three-year sequence of learning opportunities for which the Museum's outstanding exhibits and collections are focal points. Each course of study consists of special events, lectures, and seminars. The entire program is funded by the National Endowment for the Humanities. The next Learning Museum course, "South Sea Islands: Paradise and Perdition," described on pages 16-19, begins Feb. 14.

Weekend Discovery Programs. Free guided tours, demonstrations, and films. Weekend sheet available at North Information Booth lists additional programs and locations:

"Endangered Animals." Animals in danger of extinction are the focus of this 30-minute tour. Saturday, Jan. 19, noon.

"The Great Whales." A revealing 55-minute film that studies the whale's anatomy, speech, and migration patterns. Saturday, Jan. 19, 1:00 p.m.

"The Gods of Mexico." This tour investigates the religion and cultures that ruled pre-Columbian Mexico. Sunday, Jan. 20, 1:00 p.m.

"Whales, Dolphins, and Men." This 51-minute documentary considers the remarkable intelligence of dolphins and whales and also examines the whaling industry. Saturday, Jan. 26, 1:00 p.m.

"Indians of North America." The daily life of six tribes, from the Iroquois in the north to the Hopi in the southwest, is the topic of this tour. Saturday, Jan. 26, 2:30 p.m.

"Culture and History of Ancient Egypt." This 45-minute tour and movie focuses on the Egyptian artifact collection and includes a description of the mummification process. Sunday, Jan. 27, 12:30 p.m.

"Birds' Paradise: the Waddensea." Waddensea, a natural bird refuge in the Netherlands for hundreds of thousands of shore birds, is the focus of this 25-minute film. Saturday, Feb. 2, 1:00 p.m.

"Indian Fishermen of the Northwest Coast." This 45-minute tour illustrates the importance of the fish in story and art traditions, and examines Northwest Coast fishing techniques. Sunday, Feb. 3, 2:00 p.m.

"American Indian Dress." This half-hour tour explores the construction, craft, style, and symbolism of Indian dress from six regions of North America, from the northern Woodlands to the Southwest. Saturday, Feb. 9, 11:30 a.m.

"Museum Highlight Tour." Popular exhibits of the Museum are highlighted in this 30-minute tour. Saturday, Feb. 9, 12:30 p.m.

"Audubon." This film traces the travels of John James Audubon, who painted birds of North America and Europe in their native habitats. Includes Audubon's paintings from his most famous book, *Birds of America*. Saturday, Feb. 9, 1:00 p.m.

"Healers and Conjurers of the Northwest Coast." The ways that native healing men treat illness and disease are investigated in this tour. Sunday, Feb. 10, 2:00 p.m.

Continuing Programs

"The Ancient Art of Weaving." Learn about age-old weaving techniques and textile development during these free demonstrations. Monday, Wednesday, and Friday from 10:00 a.m. to noon. South Lounge, second floor.

Friend or Foe? The Natural History Game. The object here is to determine which one of a pair of apparently similar specimens is harmful and which is not. See if you can distinguish a vampire bat, a headhunter's axe, a poisonous mineral, or a deadly mushroom from its benign look-alike. Ground floor, no closing date.

On Your Own at Field Museum. Self-guided tour booklets, adult- and family-oriented, are available for 25¢ each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with scientific interests and backgrounds are needed to work in the various departments. For more information call Volunteer Coordinator, 922-9410, ext. 360.

January and February Hours. The Museum is open 9 a.m. to 4 p.m., Monday through Thursday; 9 a.m. to 5 p.m., Saturday and Sunday; and 9 a.m. to 9 p.m., Friday.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor.

Museum Telephone: (312)922-9410

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COVER

Rhaedr Ogwen Waterfall, in Snowdonia National Park, North Wales, one of many sites of geologic and historic interest to be visited by Field Museum's England and Wales Tour, departing June 14. For additional information see pages 4-5. Photo by Bertram G. Woodland, curator of petrology, who will lead the tour.

Gold of El Dorado Group Tours

Special tours of the major forthcoming exhibit "Gold of El Dorado," opening April 25 and closing July 6, may now be arranged for groups as small as 30 persons. During public hours, daily except Friday, special groups of 30 to 100 persons can be accommodated. On Tuesday and Thursday evenings (after the Museum is closed to the general public) groups of 50 or more can be accommodated.

Supplemental lectures by Museum staff for such groups, as well as private dining arrangements, are also available. For rates and other information call 786-9570.

FIELD BRIEFS

Detective Work at Field Museum

by William C. Burger
chairman, Department of Botany

ecently the Botany Department received request from a local scientific laboratory) try to identify some tiny seedlike ob-cts. All the information the lab had on ie objects (which turned out to be nearly iicroscopic) was that they *might* have ome from Puerto Rico. Offering no as-urances, we did invite the lab to send iem in, but since more than 250,000 pecies of seed plants are known to sci-nce we were not about to get their hopes p.

Upon examining the mysterious pecimens we found they were cylindri-al, had rounded ends, and were about ne millimeter (1/25 inch) long. The sur-ice was smooth and slightly lustrous, ut there seemed to be no outer epider-nis, or skin. In cross-section they were lightly hexagonal, but there was no nternal structure of any kind.

Some of us in the department sus-ected they were immature seeds, others uggested insect eggs. Stymied, we did vhat we always do under such circum-tances: we took them to Dr. Pat.

Patricio Ponce de Leon (no need to xplain why everyone at the Museum alls him "Dr. Pat") is our mycologist—omeone who studies fungi. He has a attery of chemical tests for distinguish-ng different kinds of fungi, and ften—on the basis of very little vidence—he can also tell us whether omething is animal, vegetable, or min-ral.

After Dr. Pat's initial examination is only conclusion was that our little seeds" might be insect droppings. This ossibility hadn't occurred to any of us vho looked at the "seeds" simply be-ause they were so precise in form, so ompact in structure, and had such a mooth surface. A subsequent chemical est—reinforcing Dr. Pat's suspicions—evealed that the objects were composed lmost entirely of lignin, a component of vood that is very resistant to digestion.

Taking them to the far side of the hird floor, where the entomologists vork, he showed them to Dr. Eric Smith, ustodian of the insect collection. To-gether they consulted a volume on the dentification of termites. One of the riteria used by this book in identifying ermites is the type of excrement pro-luced. In short order the mycologist-ntomologist team was able to establish hat the nearly microscopic objects were, n fact, what Dr. Pat suspected: termite droppings—specifically from termites of the genus *Reticulitermes*. This group, it so happens, does occur in Puerto Rico!

This bit of detective work had a successful conclusion. I should add, however, that sometimes we are stumped in trying to identify mysterious specimens that are sent to us, so it's a special pleasure when we do succeed.

Bronson and Lewis Appointed Anthropology Department Cochairmen

Bennet Bronson, associate curator of Asian archeology and ethnology; and Philip Lewis, curator of primitive art and Melanesian ethnology, have been named cochairmen of the Department of Anthropology. The arrangement became effective January 1. Bronson, who joined the Anthropology staff in 1971, will serve as department head April through September, 1980. Lewis, who came to Field Museum in 1955, will head the department January through March and October through December.

Volunteers Sought for "The Gold of El Dorado"

Vicki Grigelaitis, Field Museum's volunteer coordinator, has announced that special volunteers will be needed in conjunction with the major exhibit "The Gold of El Dorado," on view April 25 through July 5. The responsibility of these volunteers will be to assist visitors. Additional information may be obtained by calling Ms. Grigelaitis at 922-9410, ext. 360.

Robert R. McCormick Charitable Trust Grants

Two large grants have recently been made to Field Museum by the Robert R. McCormick Charitable Trust. A $250,000 grant has been made in support of a new major permanent exhibit to be installed in Hall 10 (formerly known as "Northwest Coast Indians and Eskimos"): "Marine Hunters and Fishers." A $65,000 grant has been made in support of the temporary exhibit "The Gold of El Dorado: The Heritage of Colombia," opening at Field Museum on April 25.

"Marine Hunters and Fishers," scheduled for completion in 1982, will be based upon some 2,500 artifacts from the Museum's collection of 18,000 materials — one of the world's most outstanding assemblages of Northwest Coast, northern California, and Eskimo materials. "The Gold of El Dorado: The Heritage of Colombia," which closes July 5, will feature hundreds of objects drawn primarily from the Museo del Oro, Bogota, Colombia.

Brimham Rocks, a sandstone formation near Ripley, Yorkshire, one of the sites to be visited during Field Museum's tour of England and Wales, June 14-July 3. For tour description see page 4.

Field Museum Tours

1980 Tour Packages Exclusively for Members

To China, England and Wales, and the Grand Canyon

People's Republic of China
May 10-31

The singular experience of a trip to the People's Republic of China can be yours! For its members, Field Museum again offers an opportunity to visit China's major attractions in the company of a well qualified lecturer. The group, limited to 25 persons, will leave Chicago May 10 and return May 31.

After overnight in Vancouver and a visit to Tokyo, you will continue to Peking, China's centuries-old capital. Relics of the imperial past, now national monuments, include the magnificent imperial palace, museums, temples and shrines, and the vast park-like Summer Palace on the shores of nearby Kunming Lake. A trip will be made to the Great Wall. The next destination, Nanking, situated on the Yangtse River, is a source of pride for the People's Republic as a center of modern development as well as for its scenic and historic attractions. Of special interest is the visit to the charming city of kweilin. The awesome surrounding landscape of jutting peaks and rocky caves brings scenes of Chinese painting to life. Kwangchow (Canton) is China's most important southern city, reflecting events in the history of the republic as well as former times when it was China's only port open to foreign trade.

For additional information on this exciting tour, contact the Tours Office and ask for the China brochure.

Geology Tour of England and Wales
June 14-July 3

Highlights of this 20-day tour, under the leadership of Dr. Bertram Woodland, Field Museum's curator of petrology (and a native of Wales), will be visits to classical areas of British geology where many fundamental aspects of geology were first discovered. The geological history and scenic development of these areas will be emphasized. Included in the tour are visits to the South Coast, West Country Cotswolds, Welsh Borderlands, North Wales, Lake District, Yorkshire Dales, and the Peak District. The group is limited to 25 persons.

Chinese mother and child

Stanton R. Cook, courtesy Chicago Tribune

Grand Canyon

Cost of the tour—$2,640 (which includes a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare between Chicago and London. First class accommodations will be used throughout. The package includes breakfast and dinner daily, chartered motorcoach, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $250 per person.

Exploration of the Grand Canyon
October 3-19

The traveler arriving in Grand Canyon may be given enough time to stand on the South Rim and to gaze in wonder into the depth and silence of the chasms before being hurried away in his charter bus to somewhere else. If he is lucky and has more leisure he may be allowed to hike part of the way down to the Colorado River along a trail as busy as Fifth Avenue on Easter. But there is another Grand Canyon that is not accessible to anyone in a hurry: the Grand Canyon of exquisite loveliness, grandeur, and solitude.

The trip will begin in the late afternoon of Friday, October 3, with the flight to Las Vegas. The first two days will be spent in the South Rim as an introduction to wilderness hiking and camping and to the geology of the area. The main part of the trip will be a 14-day river trip. The trip will be concerned with all aspects of geology, but will stress the geological history of the area shown in the great sequence of rocks representing about a third of the earth's history, the understanding of the Colorado River, her power, and the tools she uses to carve this great canyon, and the sheer joy and excitement of the river adventure.

It is on the river that we will experience, learn, and understand the canyon, the river, and the Great Southwest. We will "shoot" an unending line of rapids, some but a ripple, others rocky cataracts dropping 15 feet. At no time will we need to portage, but we will have to hold fast with both hands, and secure the luggage well. We'll get wet and tired—but happy and pleased.

We will camp out on sandy beaches, and since it will not rain, the stars and the walls of the canyon will be our companions at night. We will travel in four boats, we'll swim in the tributaries to the Colorado, or dive, jump in, or just soak. We will hike to places of unusual geologic and anthropologic interest, sometimes through the most pleasant and enchanting stream beds and valleys, at times along steep walls and waterfalls.

But above everything else, we'll live a time of geology. We will think earth while we eat, swim, dream, walk, and relax. We will see and study more geology in this one brief period than can be seen anywhere else in comparable time.

The trip will end in Lake Mead. From there we'll go by bus to Las Vegas, then fly home—sad to leave the Great River and a grand fortnight of our lives, but happy and proud to have experienced it.

Although the trip will not be rigorous, numerous innercanyon hikes are planned. Camping out on the river will be without tents. Meals will be excellent. A pre-trip meeting at Field Museum is scheduled for Saturday, February 9, at 2:30 p.m. Dr. Matthew Nitecki, curator of fossil invertebrates, will lead the trip. The cost of $1,500 covers all expenses (including air fare, boat fare, meals, camping, sleeping bags, etc.), and a donation of $250.00 to the Field Museum. The trip is limited to 19 persons.

For additional information and reservations for all tours, call or write Dorothy Roder, Field Museum Tours, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605. Phone (312) 922-9410.

England's Lake District, immortalized by Wordsworth, Coleridge, and Southey.

A Ming dynasty handscroll (Cat. 125947), attributed to Chou Ch'en. Now mounted fully extended in a frame, the scroll shows a series of 25 adult figures, 15 of whom are reproduced here and on the following pages.

PHYSIOGNOMY IN CHINESE FIGURE PAINTING: A Case Study

By Art Pontynen

A Chinese Handscroll in the Field Museum collection is a rare example of Chinese figure painting in which persons of various social status are realistically presented. The painting was acquired by Berthold Laufer, then curator of anthropology, during his 1923 expedition to China.

He purchased it from the collection of T. R. Abbott, Laufer's host in Peking, who provided him with invaluable assistance in locating and acquiring art works. The painting is similar in subject and treatment to pictures comprising an album painted by the sixteenth-century artist Chou Ch'en. Now entitled "Displaced Persons Pictures," Chou Ch'en's album exists in the form of two separate handscrolls, one in the Honolulu Academy of Art, the other in the Cleveland Museum of Art.

The Field Museum handscroll (324cm x 26cm, or 12'9" x 10¼") is rendered in tones of grey and black ink on silk. The figural portion, depicting 25 adults, three infants, and several animals, is followed by two hand-written notices, or colophons, now separated from the body of the painting. The first colophon is dated to the twenty-seventh year of the Tao-kuang reign period (1847), and written by a certain Ch'en Ch'uan at the request of the owner. The latter, a nineteenth-century collector by the name of Chuang Chin-tu, had asked Ch'en Ch'uan to attribute the unsigned painting to a known artist. Accordingly, Ch'en

Art Pontynen is a doctoral candidate in Chinese and Japanese art history at the University of Iowa.

Ch'uan attributed it to Chou Ch'en, artist of the Honolulu-Cleveland handscrolls.

Chuang's seals, identifying him as the collector, are on the silk, figural portion of the Field Museum painting and on the paper of the colophon portion. There are also two impressions of an unidentified seal and three others that bear the name of Hsiang Yüan-pien, a distinguished collector who lived during the Ming dynasty (1368-1644). If genuine, these seals indicate that Field Museum's scroll also dates to the sixteenth century.

In comparing the style of Field Museum's scroll with that of the Honolulu-Cleveland album, it seems certain that Field Museum's is a copy of that original work. The practice of making copies of admired paintings is a long-standing tradition in China; and there are many famous Chinese artists whose work is known solely through such copies. For an aspiring Chinese artist, copying was a means of learning the techniques and styles of past masters as well as an act of reverence toward them. While in the West copies are often instruments of deception meant to be falsely represented as originals, in China they are traditionally intended to instruct the viewer in the achievements of great artists of the past.

The first figures, from right to left, on Field Museum's scroll are a monk and a fortune-teller, followed by characters of varying social status and fortune. The figural section ends with a group of three women. Significantly, there are differences between Field Museum's scroll and the Chou Ch'en original. Although most of the figures in the original do appear in the Field Museum copy, some are omitted; and some to be seen in the copy do not appear in the original.

The placement order of the figures in the Field Museum scroll might suggest that at the time this copy was made, the Honolulu-Cleveland album had not yet been mounted in handscroll format, or at least that the order of figures in the original did not prevail at the time of copying.

The figures not to be seen in the original but present in the Field Museum scroll are: a group consisting of a man and woman, each holding an infant, a stooped-back man, a one-eyed man holding a chipped bowl, and three more women. These figures may well be copies of original figures by Chou Ch'en that are now lost.

Chou Ch'en's decision to paint a series of figures ranging in status from the affluent to the destitute is in part explained by the colophon on the Cleveland portion of the original:

> *In the autumn of the Ping-tzu year of Cheng-te (1516), in the seventh month, I was idling under the window, and suddenly there came to my mind all the appearances and manner of the beggars and other street*

*characters whom I often saw in the streets and markets. With brush and ink ready on hand, I put them into pictures in an impromptu way. It may not be worthy of serious enjoyment but it certainly can be considered as a warning and admonition to the world. Recorded by Tung-ts'un, Chou Ch'en.**

So the artist himself explains that the painting was intended to serve a didactic function: to stimulate the viewer to contemplate the vagaries of life and fortune.

Why did Chou Ch'en produce such an unusual work in the context of Ming figure painting? Figure painting in China often had a didactic function, and highly respected persons, both historic and (then) contemporary, were painted for adulation and emulation. Two commentators on art—Hsieh Ho in the sixth century and Chang Yen-yüan in the ninth—emphasize that painting perfects the civilizing teachings of the sages and helps to maintain social relationships. A twelfth-century writer, Han Cho, comments however that "whenever painting figures, one should not use coarse, vulgar types, but venerate those that are pure and elegant. . . ."

Although Chou Ch'en had to have known of the didactic function of painting, he was obviously not in agreement with Han Cho. So we must look for an alternative explanation or tradition to understand his approach. One such alternative may be seen in an eleventh-century text on painting by Kuo Jo-hsü:

Those who paint secular figure subjects must distinguish between the look of rich and poor, and the robes and head-gear of the [different] dynasties. In the case of Buddhist monks the faces [should tell of] good works and practical expedients . . . . Peasants will naturally possess the very essence of unsophistication and country simplicity, plus such other [special characteristics] as respectfulness or obstinacy, joy, or sorrow.

Although Kuo Jo-hsü was receptive to the idea of painting "vulgar types" and provided a formula for doing so, his advice falls short of endorsing the harshly realistic subject matter we see in Chou Ch'en's work. Another possible sanction for Chou Ch'en's approach was enunciated by the great eleventh-century poet Su Tung-p'o:

Portrait painting and physiognomy are the same art. . . . There is some part in every man where his particular disposition resides. Some have it in the eyebrows, some in the nose or the mouth.

*Lee, Sherman. "Literati and Professionals: Four Ming Painters," *Bulletin of the Cleveland Museum of Art*, January, 1966, p. 10.

It was widely believed that a person's character as well as his fate could be "read" in one's face or in some other physical feature. The prevalence of this theory can be judged by the opposition to it by Hsün Tze (320-235 B.C.), a prominent Confucianist. In his essay "Against Physiognomy" Hsün Tze cites numerous examples of famous persons whose physiognomy was far from promising. He notes that "To physiognomize a person's appearance is not as good as to consider his heart; considering his heart is not as good as to select his principles."

Although the harsh realism of the Field Museum scroll is exceedingly rare in Chinese figure painting, it is apparent that the renderings of the figures still follow certain specific traditions. The theory that a person's physiognomy reflects one's character and destiny—though dating from an assumedly pre-Buddhist period—nevertheless is congenial to the Buddhist concept of karmic retribution and rebirth. The belief that one can benefit from a visual contemplation of venerated figures of the past goes hand-in-hand with the concept that a person's appearance reflects his character. This attitude persisted through the centuries, and it was poet-artist Su Tung-p'o who stated that portrait painting and divining character by means of the "science" of physiognomy are essentially the same.

There are two conclusions that might be drawn concerning the Field Museum scroll and its relationship to the Honolulu original: The figures found only in Field Museum's may represent figures originally painted by Chou Ch'en but no longer extant or available; the Field Museum painting could thus be a more complete visual documentation of sixteenth-century Chinese life than the original. The sequence of figures in the Field Museum scroll may also reflect the intended order of the original album leaves painted by Chou Ch'en.

We also see in the Field Museum painting some of the primary motivations and principles of Chinese figure painting. Chou Ch'en depicted human figures in accordance with three time-honored traditions:

First, in his rendering of physical features, he sought to reflect the subject's character and/or destiny. Secondly, he differentiated between social and professional classes by contrasting a Buddhist monk, a fortune teller, and refined ladies with the less fortunate. He thus ignored prevailing strictures against depicting the infirm or the otherwise disadvantaged. Chou Ch'en's penetrating yet seemingly sympathetic vision provides us with a rare candid account of life in sixteenth-century China.

Finally, Chou Ch'en observed a primary rule of Chinese figure painting by providing the viewer with a lesson: physiognomy notwithstanding, the vagaries of life are many.

The Mysterious Sarcophagus in Hall J

"The marble Greco-Roman sarcophagus on display along the west wall of the Museum's Egyptian Hall," *wrote Christopher Legge in the January, 1969,* Bulletin, "probably draws only casual glances from most visitors, yet on the eve of the World's Columbian Exposition in 1893, this same artifact caused a brief minor furor."

Today the sarcophagus occupies a central position in Hall J, and is the constant object of curious scrutiny, particularly by visitors who had heard—incorrectly—that it was the burial vault of Queen Cleopatra!

*Legge's article, reproduced here for the benefit of the great many readers who did not see it originally, dispels that myth and sheds additional light on the curious history of artifact #31842:**

During the 1890s, popular interest in things Egyptian was rising in intensity. It was natural, then, that this interest would be reflected in some of the Exposition exhibits. Among the attractions there were a "Temple of Luxor" and the "Streets of Cairo," where a dancer called "Little Egypt" caused both sensation and scandal. The sarcophagus, too, was to have been a prominent part of this turn-of-the-century extravaganza and although this never came to pass, the artifact's checkered history is an interesting one.

It was discovered in 1888 by workmen digging a well near Alexandria. Unfortunately, the discovery was unattended by any scientific investigation, a lack which has defeated later attempts to place it historically. In unearthing the sarcophagus, the funerary chamber was destroyed and the debris scattered. However, it was soon put on display with this astonishing notation:

"Sarcophagus of Queen Cleopatra, discovered at Ramleh, near Alexandria. This sarcophagus was found at a depth of 30 feet, but for the convenience of visitors, it has been lifted to its present position."

A second label read, "For particulars apply to Mr. G. N. Frangouli, Tobacconist, Alexandria."

Despite this shaky documentation, *Halligan's Illustrated World's Fair,* which described itself as a "Pictorial and Literary History of the World's Columbian Exposition," wrote in its issue of September, 1891, "the recent discovery . . . of Queen Cleopatra, is by far the most valuable find yet made in curio-fraught Egypt. The proposition to bring this interesting historical relic to the World's Fair at Chicago makes a consideration of the discovery particularly opportune. The principle bas-relief is the central one, which represents the head of a woman. This is a magnificent specimen of the sculptor's art: the woman has an asp on each temple and agony is depicted in the expression of the face, which is

The sarcophagus being excavated in 1888 at Ramleh, near Alexandria, Egypt. When first displayed in Egypt it was touted as being that of Cleopatra, a claim later discredited.

The sarcophagus as it may be seen today in Hall J

a remarkable one. The well-shaped nose, with its full nostrils, the determined jaw indicate the masterly spirit of a woman accustomed to command. The forehead is rather low but there is evidently a massive head behind that and when one compares this bust with that on one of the coins struck in Cleopatra's reign, the likeness is at once perceptible. Among the remains found in the sarcophagus was a skull of unusual size with a low forehead and a great development at the back of the head—undoubtedly that of the voluptuous queen."

Col. Samuel Lawrence James, an ex-Confederate army veteran and prominent citizen of New Orleans, was travelling in Egypt about the time the article appeared and bought the sarcophagus from the Egyptian government, paying $4,000.

A Chicago newspaper clipping of unknown date, but probably shortly before Col. James died in 1894, gives the information that owing to a number of complications, he decided not to exhibit it on the Fair grounds. It would, however, together with the remains of Cleopatra and a number of mummies, be soon exhibited at a store at 335 Wabash Avenue, which had been converted into an exact but smaller reproduction of the famous temple at Denderah. The article claimed that leading scientists had no doubts that the sarcophagus was that of Cleopatra. Details of this establishment have been lost in obscurity and its site, now 514 S. Wabash, is occupied by George Diamond's Steak House.

In 1904 and probably for several years before, the sarcophagus lay in Blakelee's warehouse on S. Western Avenue. In that year, S. L. James, Jr., as executor of his father's estate, gave it to Field Museum. In a letter to the Museum's director he said that although his father had bought it under the assumption that it was Cleopatra's, he could not vouch for its authenticity.

The sarcophagus, without a reference to its possible connection with Cleopatra, is mentioned in the Museum's annual report as being part of the most important acquisitions through gift for the year. Several other Egyptian artifacts were included in the acquisition. Any association with "one of the most imperious, wilful and wicked of the world's women" ("Halligan's Illustrated World's Fair") has become even more improbable since then. Present-day archeologists believe that the central bas-relief represents Medusa and that the sarcophagus is one of a group of Alexandria sarcophagi of Proconnesian white marble from quarries on the island of Marmara in the sea of that name and that in round figures they can be dated between 150–250 A.D., a period 180 to 280 years after Cleopatra's death.

The sarcophagus, largely unnoticed in its present dignified setting, has travelled from Ramleh to Wabash Avenue to Field Museum, missing its chance to become a part of the great World's Columbian Exposition along the way, but nonetheless a subject of astounding claims and, later, of academic inquiry—all without revealing its history. To that extent, its mysterious aura remains.

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*Christopher Legge's article first appeared in the January, 1969, *Bulletin* under the title "We Don't Know Whose It Was But It Wasn't Cleopatra's." Legge was custodian of the anthropology collection from 1962 to 1974.

BRYAN PATTERSON, 1909–1979

By William D. Turnbull

Bryan Patterson, a member of the Department of Geology staff from 1926 to 1955 and a distinguished member of the National Academy of Sciences, died December 1 in Boston. He was 70 years of age. Patterson's Field Museum career began at age 17 when he arrived from Malvern, England. His father, Col. J. H. Patterson (who shot the famed Tsavo man-eating lions on view in Hall 22), asked Stanley Field, then president of Field Museum, if the Museum could find some way to use the lad. Months later young Patterson appeared on the Museum's doorstep. Thus a remarkable career was launched.

For the next three years Patterson served as preparator for the Department of Geology, following this with five years as division assistant. For seven years he then served as assistant curator, and finally for fourteen years as curator, with time out during World War II for service in the U.S. Army. In 1955 Patterson left Field Museum to accept an Alexander Agassiz Professorship at the Museum of Comparative Zoology, Harvard, a chair he held until 1970. He continued to serve Harvard for five more years as professor of comparative paleontology, and after that continued as professor emeritus. Throughout his Harvard tenure, Patterson retained affiliation with Field Museum as a research associate.

At Harvard Patterson continued research investigations that he had begun at Field Museum: Paleocene and Eocene faunas of the DeBeque Formation of Western Colorado; Early Creataceous and Eocene-Oligocene faunas of the Texas Trinity and Vieja Formations; and Mid and Late Tertiary faunas of South America. New endeavors at Harvard included explorations in East Africa. In 1971 he made worldwide headlines as leader of an expedition to Kenya, where his crew unearthed the jawbone of man's five million-year-old ancestor, *Australopithecus*. At the time it was the earliest such specimen known. Four years earlier he had made another *Australopithecus* discovery. The 1967 fragment pushed back the human evolutionary record to 2½ million years from the prior record of 1¾ million years set by Louis and Mary Leakey. Early in his Harvard tenure Patterson received his most coveted honor when he was elected a member of the National Academy of Sciences.

Bryan, or Pat, as he was known to Field Museum colleagues, was a phenomenon. He had an insatiable curiosity, a compulsion to read—no, to devour—the written word, and a *joie de vivre* that transformed almost every occasion into a once-in-a-lifetime experience. He commanded a wealth of knowledge within and beyond his field that was indeed remarkable, all the more because he was largely self-taught. His only formal graduate training consisted of selected courses taken at the University of Chicago during his early years at the Museum. He had a photographic mind, and as soon as he perceived a need to know something—say an embryological detail—he would pursue the search tenaciously.

The late James H. Quinn, former chief preparator of the Department of Geology, once pointed out to me that while Pat was a preparator his heart may have been with it, but his intellect went far and away beyond. In Quinn's words, "A few weeks after Pat's arrival, Elmer S. Riggs asked him to go to the Museum library to look up some obscure point or reference, and that was the end of the preparation. Pat discovered the library, put his nose in a book and never got it out again." (Riggs, then curator of fossil vertebrates, was Patterson's predecessor in that post.) I have always remembered that statement for, in addition to its revealing touch of envy, it shows that Pat's peers at the time recognized his great gift and accepted his scholarly ability long before the institution officially did so.

During Pat's early years at the Museum he financed his own field work, there being no funds available for that purpose for so inexperienced a hand. One such trip, perhaps his first, was to the nearby, now world-famous Mazon Creek Pennsylvanian locality (an hour's drive

Bryan Patterson as he appeared in cover photo of the April, 1968, Bulletin. *A practical joker who would carry out an elaborate scheme for the sheer fun of it, he is shown here holding an alleged "dancing worm" or "tully monster," which he supposedly had just bagged in the wilds of Kenya. The only known specimens of the creature* (Tullimonstrum gregarium) *are Coal Age fossils from Illinois. Not an attempt to hoodwink the reader, the photo supplemented a humorous article on Patterson's elaborate prank.*

southwest of Chicago). Pat spent his first vacation there in 1928, collecting plant, invertebrate, and vertebrate fossils. His collection—now dwarfed by the hundreds of thousands of specimens collected there since by curators George Langford, Eugene Richardson, Gordon Baird, and a host of amateurs— constituted the bulk of the Museum's early holdings from this locality.

Several years later, still at his own expense, he began the first of his long-term serious research efforts. Accompanying Riggs to western Colorado, Pat began collecting from the latest Paleocene and Early Eocene deposits of the DeBeque Formation. The geology of the area was so poorly known that not until he began study of the materials was he able to demonstrate the presence of a Paleocene section distinct from the Eocene.

These positive results led to the Museum's support of six subsequent field seasons of work there. Considering the small number of personnel, the scarcity of specimens, and the difficulties of terrain during those field seasons, a remarkable collection was accumulated. It was well documented with good stratigraphic and locality information, at a level quite acceptable today, but exceptional for the time. This effort resulted in nine publications on the Paleocene forms. And there are a number of manuscripts in various stages of completion, some of which must be published in order that the wealth of information they contain can become part of the record.

There is no doubt that his years of work in Colorado shaped and molded Pat to a high degree. He became a master at this craft and was well started on the road to preeminence. In 1947 he and Quinn spent the summer field season in west Texas, in the Big Bend area of the Rio Grande country west of the Pecos, where they collected the first extensive series of specimens from the Latest Eocene-Earliest Oligocene sediments of largely volcanic origin.

Simultaneous with the western Colorado work Pat began study of a large series of materials already at hand, collected by Riggs in South America in the 1920s from Mid and Late Tertiary deposits, mainly in Argentina and Bolivia. This aspect of Patterson's work has produced an outpouring of publications that continues even today, and which also opened the way for studies and publications on fauna as varied as the Phororhacoid birds, marsupials, edentates, typotheres, astrapotheres, toxodonts, pyrotheres, and rodents. The most recent of these is a co-authored (with Albert E. Wood) monograph on South American rodent evolution. Pat and Larry G. Marshall, a Field Museum vertebrate paleontologist, have cooperated to bring into final form several of Pat's South American faunal and stratigraphic studies.

Patterson's major field work in Texas was recovering and studying the teeth of the Early Cretaceous mammals of the Trinity Formation of north Texas. En route to 1949 professional meetings in El Paso, some of his Field Museum colleagues stopped to check a locality near Forestberg, Texas, reported to have fossils of special interest that were eroding out of the earth in great abundance. The reports proved to be more than valid, and Pat was called to investigate the site further.

Bryan Patterson, about 1955

He spent several months the following season alone there, digging out and wet-sieving uncounted tons of Trinity sand matrix. He recovered well over 100 of the small teeth, representing not just tricodonts, but a number of other fauna as well. His report on one of these—primitive therians—appeared in *Fieldiana* (Field Museum's monograph series) in 1956, and has become a classic.

Patterson's Chicago years were a time not only in which he was molded into an acknowledged leader in his field, but also in which he most definitely helped to mold the Museum. In addition to the vast and important collections he made, his gifts to the Museum were many and varied; but his greatest gift was the intellectually stimulating effect of his enthusiams and dedication.

Although never trained to teach, Pat had a certain natural gift for it: he made his subject interesting by the manner of his presentation, and he enjoyed doing it. He gave of his time to serious students apparently ungrudgingly, whether or not they were formally enrolled.

Pat served the Society of Vertebrate Paleontology as its president in 1948–49. He was a member of the Society for the Study of Evolution, the Geological Society of America, the American Association for the Advancement of Science, and several other professional societies. The end of the Chicago years was marked by the honor of the Harvard appointment. Another honor bestowed upon him more recently resulted from his brief work in Central America, undertaken as a consequence of his interest in the faunal interrelationships and interchanges between North and South America. A museum in Estanzuela, Guatemala, is named in his honor, recognizing his work there.

Pat is survived by his wife, Bernice Caine Patterson, and a son, Alan.

William D. Turnbull is curator of fossil mammals.

Edward E. Ayer Film Lecture Series

March and April

James Simpson Theatre

Saturdays, 2:30 p.m.

The entrance to Simpson Theatre is conveniently located inside the west entrance. This is of special interest to the handicapped, for the entrance is at ground level, with all steps eliminated. The west entrance also provides free admission to the theatre. Access to other Museum areas, however, requires the regular admission fee (except on Fridays) or membership identification. The film/lectures are approximately 90 minutes long and recommended for adults. Reserved seating available, until 2:25, for members. Doors open at 1:45 p.m.

March 1

"Holy Lands" by Charles Forbes Taylor

This nonsectarian film takes us to Damascus; places of the Patriarchs, Judges, Kings, and Prophets; the route of Moses; Bethlehem Shepherds' cave; Herod's castle, Galilee, Jacob's well, Mt. Zion, Jerusalem, Pilate's palace, Calvary, and more.

Portugal (March 22)

Land and Sea Adventure: Naples piazza (March 29)

March 8

"Exploring Darwin's Islands" by Quentin Keynes

Keynes first shows us the volcanic scenery, giant tortoises, and other unique Galapagos life. Then we step ashore on Ascension, and carry on to St. Helena, where Napoleon was exiled. In the Falklands we travel by hovercraft and see the remarkable King penguins and elephant seals.

March 15

"Norway" by Ed Lark

A country wedding, Laplanders, Europe's largest glacier, the incomparable fjords, the midnight sun are highlights of this film.

March 22

"Portugal" by Frank Nichols

Portugal today is a blend of old and new. The old can be seen in fishing villages where men dress in traditional plaids and women wear seven-petticoated dresses. The new is reflected in deluxe resorts of the Algarve.

The ever-winding Rhine (April 26)

March 29

"Land and Sea Adventure: by Freighter to the Adriatic" by William Sylvester

Ports of call Sylvester takes us to (aboard a freighter) include New Orleans, Casablanca, Genoa, Portofino, Naples, Capri, and the Yugoslavian Riviera.

Hawaiian waterfall (April 19)

April 5

"Central America" by Jonathan Hagar

Guatemala, with ancient Mayan sites; El Salvador, with coconut harvesting; Honduras, rich in mahogany forests; Panama, transected by the busy canal; Nicaragua, with views of earthquake-ravaged Managua; and Costa Rica, with its rich tablelands.

April 12

"Bavaria: Land of the Mountain King" by Howard and Lucia Meyers

We see the Passion Play at Oberammergau, visit the home of Prince Constantine, see the hamlet of Gergweis (with 500 persons and 5,000 dachshunds), and we are dazzled by a 4,000-candle spectacle at the Castle of Herrenchiemsee.

Bavaria: Neuschwanstein Castle (April 12)

April 19

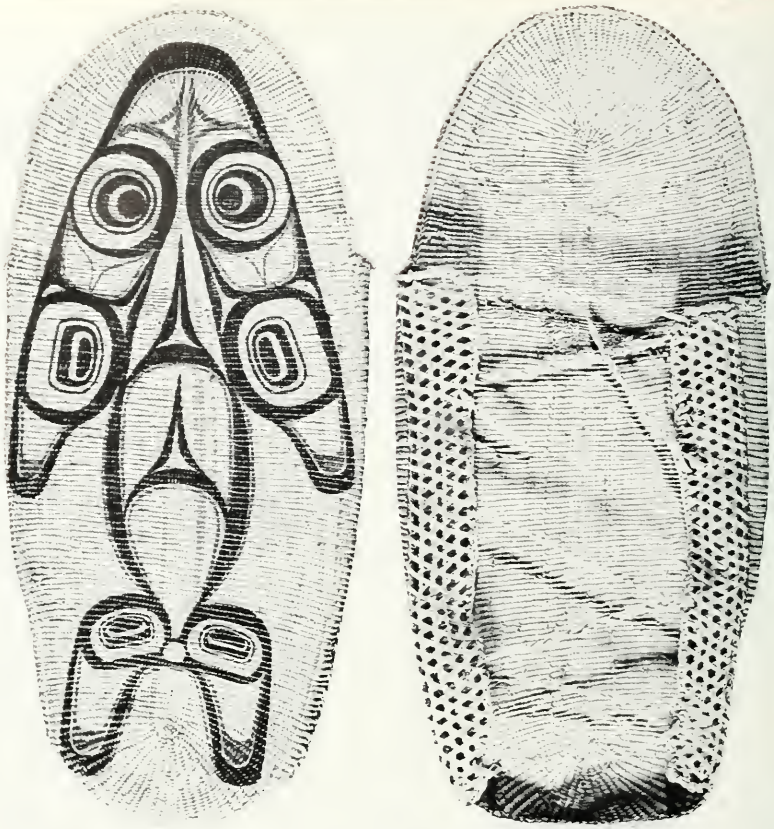
"The Hawaiian Adventure" by Doug Jones

Film highlights: erupting volcanoes, waterfalls, the art of lei-making, the old leper colony on Molokai, Queen Liliukolani's palace, the sugar industry, surfing.

April 26

"The Majestic Rhine" by John Roberts

From its source high in the Alps to its North Sea mouth, the Rhine is one of the world's busiest and most colorful waterways—a vital artery of Switzerland, Germany, France, and the Netherlands.



Haida cradle board, back (left) and front

AMERICAN INDIAN CRADLE BOARDS

By Caroline J. Anderson

Like Traditional North American Indians, modern American parents have discovered the comfort and convenience of back carriers for baby. The present-day equivalent of the Indian cradle board is an aluminum frame and fabric carrier which is slung over the parent's shoulders. Having carried my own boys in these back frames, I was struck by comparisons when I happened upon an article published in 1887 on "Cradles of the American Aborigines," by Otis Mason, then curator of ethnology at the Smithsonian Institution.

Here were sketches and descriptions of a wide variety of Indian cradle boards. I was amazed to see design features, including sun shades and play toys, that would have made useful additions to my own twentieth-century model. Other features seemed strange or cruel and aroused my interest in how the cradle boards had been used.

Reading up on the subject, I found that cradle boards were used by most North American Indian tribes, ranging between the arctic regions and Mexico, and in some areas they have been used for hundreds if not thousands of years. In the far north where extreme cold was a problem, infants were commonly carried in the hood of a mother's fur parka. In Mexico

and other southern areas, babies were more often held or supported on a mother's hip. But between these extremes, the cradle board was common. It might be constructed of wood, skin, bark, or basketry. Each tribe seemed to have its own design and many cradles were elaborately or symbolically decorated. In some cases the cradle for male infants was much more elaborate than the one for females. In every case that I observed, the cradle was carried by a strap across the mother's forehead rather than by the shoulder strap which is common today. And it was always mothers—not fathers—that were carrying the cradles.

Many, but not all, of the cradle boards were designed to be used both vertically and horizontally. This required that the child be tightly secured. A sleeping child could then be removed from his mother's back while still on the cradle board and laid on a bed or placed to swing gently from a tree branch or hook. The child would not have to be awakened. The convenience of this system will be appreciated by any parent who has struggled to remove a sleeping child from a back frame and then tried to get the child back to sleep in a crib. However, many modern parents would object to the "tightly bound" aspect of most cradle boards. Arms and legs were likely to be immobilized, especially when the child was very young. One might expect this to be uncomfortable if not damaging to the child's development.

One investigator who was interested in this issue was psychologist Wayne Dennis. He studied the southwest Indians during the 1930s and found no difference in age of walking be-

North American cradle boards (clockwise from top left): Pueblo (Hall 7, case 25), Iroquois (Hall 5, case 15), Sauk and Fox (Hall 5, case 4), Yuma-Mohave (Hall 7, case 44), Apache (Hall 7, case 53), Chippewa (Hall, 5, case 16)

Cradle boards of Crow, Cheyenne, and Arapaho. Hall 6, case 15. Apache (from photo)

tween those babies who were raised on cradle boards and those that were not. His writings provide a good illustration of how the cradle board was used by the Hopi Indians at that time. (The cradle board, in this case, was described as a "heavy board about one foot wide and two and one-half feet long. At one end of the board is fastened a face- or head-guard of stiff wire.")

> *In order to place the infant on the board, the child, naked or wearing a shirt or diaper, is put on a cotton blanket which lies on the board. The infant's arms are extended by his sides and the right side of the blanket is pulled tight over his right arm and is put between the left arm and the left side and tucked under the infant's body. The left side of the blanket is then pulled firmly over the left arm and tucked under the right side of the child. The part of the blanket which extends beyond the feet is folded back under the infant's legs and buttocks. The infant, thus wrapped, is tied to the board by strips of cloth which encircle the baby and the boards. The wrapping includes the legs which are thus fastened so that they can be flexed only to a slight degree. The infant is so firmly wrapped and tied that he cannot turn his body and cannot release his hands from the bindings. Only the head, which rests on a small pillow or pad of folded cloth, is relatively free to move.**

Dennis explains that the infants placed on these particular cradle boards were bound to

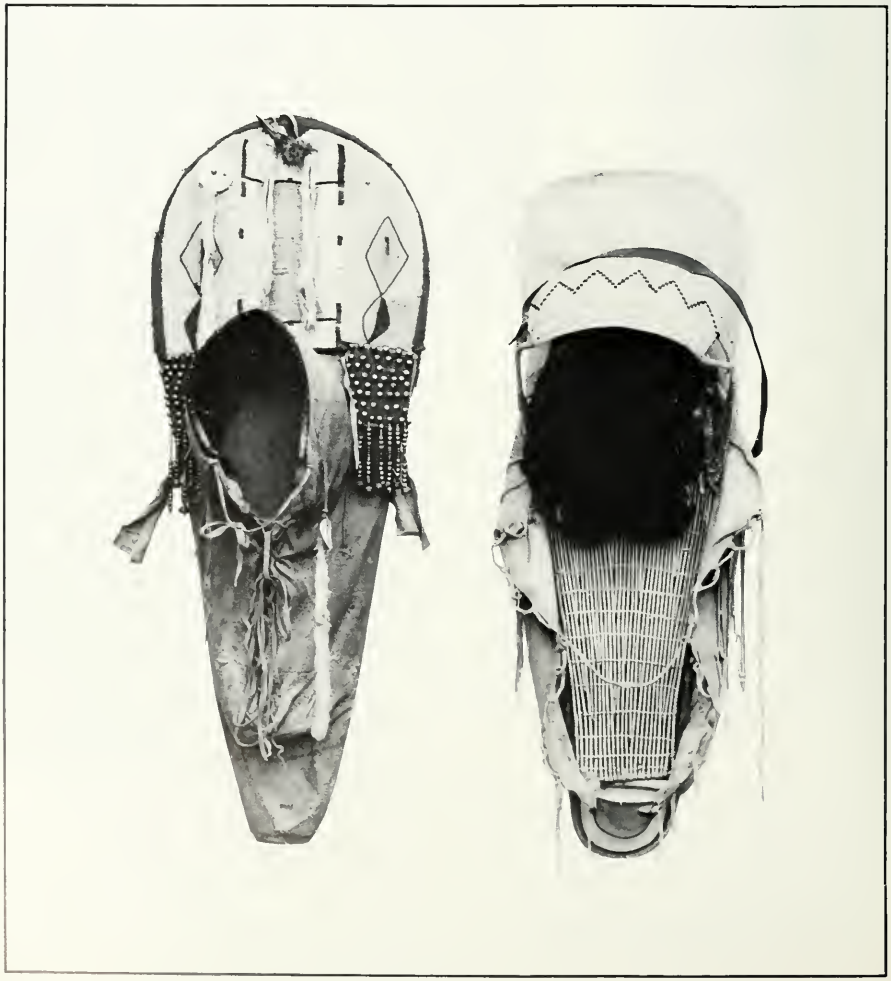
*Dennis, Wayne and Dennis, Marsena. "The Effect of Cradling Practices upon the Onset of Walking in Hopi Children," *Journal of Genetic Psychology*, 1940, 56, 77–86.

the board on the first day of life and for the first three months spent nearly all hours in that position. "Although he is taken off one or more times daily, either for bathing or for replacing soiled cloths, these operations do not consume many minutes and he is returned to the board when they are completed. The infant nurses while tied to the board, the cradle with child attached being held to the mother's breast. He sleeps on the cradle at night as well as day." After the first three months, babies spent less time on the cradle boards although the cradles were still used for periods of sleep. The cradle was usually discarded between the sixth and twelfth months of age.

The "face- or head-guard" described by the Dennises was a common feature of many cradles. They were constructed of different materials, but they all provided protection and a convenient way to attach a sun shade or insect shields. The head guards also provided an ideal place from which to hang play toys. I had thought it was a twentieth-century idea to provide mobiles for auditory and visual stimulation, but George Catlin describes similar features on Sioux cradles that he saw in the early 1800s.

For us, the strangest custom involving cradle boards is probably the custom of head shaping, which is reported among Indians of both the northwestern and southeastern United States. It is best known among the Flat Heads of the lower Columbia River region. The cradle boards of this tribe were designed with a board that would rest tightly upon the baby's forehead and could be drawn more tightly as

Kutenai and Paviotso cradle boards (Hall 6, case 35)



Pawnee and Wichita cradle boards. (Latter only on view in Hall 5, case 49.)

the weeks went by. This produced a head shape in which there was a flat surface from the tip of the nose to the crown of the head. The specific origin and purpose of this head flattening is not clear. In the *Handbook of American Indians*, Hodge notes the custom with this explanation: "The motives of intentional deformation among Indians, so far as known, are the same as those that lead to similar practices elsewhere; the custom has become fixed through long practice, hence considered one of prosperity and duty, and the result is regarded as a mark of distinction and superiority."*

In 1887 Mason observed that:

> *By this remarkable operation the brain is singularly changed from its natural shape, but in all probability not in the least diminished or injured in its natural functions. This belief is drawn from the testimony of many credible witnesses who have closely scrutinized them and ascertained that those who have the head flattened are in no way inferior in intellectual powers to those whose heads are in their natural shape.**

Recently when in Alaska I saw an Athapaskan cradle that had been used by a non-Indian family. This family knew of an Indian lady that still makes the cradles, and they were asking to have one made for their daughter who is now grown. In a moment of weakness I inquired about the price and was told it would cost $50 or $70—an amount well beyond my budget; but I was delighted to know that Indian cradles are still being made and passed along to future generations.

*Hodge, F. W. (ed.) *Handbook of American Indians*, Washington, Government Printing Office, 1907.

*Mason, Otis. "Cradles of the American Aborigines," *Report of the National Museum*, 1887, 161–212.

Endangered Whooping Crane Killed by Eagle

A preliminary investigation by the U.S. Fish and Wildlife Service has indicated a six-month-old endangered whooping crane was attacked in flight and killed by an eagle near Rangely, Colorado.

Initial examination of the bird and interviews with observers indicated the whooping crane died as a result of talon wounds inflicted by a large raptor.

According to a party of hunters, the white whooping crane rose from a small pond with two darker birds—apparently sandhill cranes. When the birds attained altitude, the whooper was struck by a large dark bird, presumed to be a golden eagle

The hunting party recovered the whooping crane carcass, and upon noting that it was banded and had a radio transmitter attached, turned it over to the Colorado Division of Wildlife.

A Fish and Wildlife Service spokesman said that while eagles have been known on rare occasions to take geese and other birds in flight, to his knowledge it was the first observed taking of a whooping crane by an eagle. Less than 100 of the species remain in the wild.

Superpowers Unite to Save Siberian Crane

On July 2, 1977, a young American agent in Moscow waited anxiously for her Russian contact. Upon his arrival, she sped to the airport, picked up a sealed plywood box, and hopped on the first flight to London. Unlike typical spy capers, this cloak-and-dagger scenario was diligently planned by scientists and government officials both in the U.S. and U.S.S.R.

The box which was transferred from the Russian to the American contained four carefully-insulated eggs of the extremely rare Siberian crane *(Grus leucogeranus)*. Quick conveyance of these eggs was a vital step in this cooperative venture between the International Crane Foundation the Soviet Union, and the U.S. Department of the Interior to save the Siberian crane from extinction.

White plumage in cranes has come to forbode a shaky future status. Of the world's 15 crane species, only three—the Siberian, whooper, and Japanese crane (also known as the red-crowned crane)—are predominantly white. These three species each number less than 400 individuals, being the rarest members of a diminishing family, whose other endangered species number in the thousands.

Today, the Siberian crane overwinters in scattered areas of China and India. A population of about 300 birds from northeast Yakutsk flies across tundra and forest to winter in China along the Yangtze River Basin, and a smaller flock of about 50 migrates more than 3,000 miles from the Ob River of western Siberia across five countries to India's Keoladeo (Bharatpur) Ghana Bird Sanctuary.

Once, the Siberian crane maintained a wide winter distribution over China and India. The major factor contributing its demise is considerd to be the widespread destruction of the shallow wetlands on which the cranes depend for food. The birds feed on the tubers of sedges which grow in these swampy areas. During years with high water levels, the cranes disperse in small groups to numerous areas of available habitat. However, during winters of low water, they must congregate in larger flocks at the few remaining ponds. Over the last century, this type of habitat has rapidly disappeared from southern Asia, as humans drain them during development and for cattle grazing land. Any further loss could well mean extinction for the Siberian crane.

Politics in that corner of the world also causes problems. For example, Chinese ornithologists have refused to tell their Soviet counterparts exactly where the Yakutsk cranes overwinter. Soviet conservationists believe that unregulated hunting of the Ob River cranes in Afghanistan and Pakistan has further contributed to that population's decline.

Since 1974, the International Crane Foundation (ICF) of Baraboo, Wisconsin, has been studying the biology of Siberian cranes. Together with the Russians,

Whooping cranes (Grus americana) *in diorama in Hall 20. Mottled bird is immature.*

ICF has initiated an ambitious program to propagate these cranes in captivity, so that they ultimately may be restocked in the wild. Its plan: reintroduce the Siberian crane as a winter migrant to Iran. Today, Iran has a comprehensive conservation program with the ambitious goal of reestablishing all species of birds and mammals once native to the country. To accomplish this, the Iranians have established many refuges to protect remaining wildlife. Thus, in 1975, Iran's Department of the Environment agreed to adopt the Foundation's plan.

ICF believes that if the Siberian cranes can be "tricked" into migrating to Iran for the winter, the bird and its habitat will be adequately protected. The plan is to place eggs of the Siberian crane in the nests of the common crane, a species which also nests in Siberia. The common cranes would hatch these foster chicks and lead them to their wintering grounds in Iran. The Foundation's involvement is essential to the success of this operation, because common cranes already have hatched their chicks by the time Siberians are laying eggs. By artificially altering the light (day-night) schedule of the Siberian cranes, ICF can induce them to lay their eggs at the same time that wild common cranes are nesting. Then, these eggs would be flown to Siberia for substitution.

Retrieving eggs from wild Siberian cranes brought its share of problems. The act was the culmination of over two years of international negotiations. Importing the eggs of this rare bird involved extensive application and permit approval under the Endangered Species Act. Dr. Vladimir Flint, a Soviet crane expert, was able to find only five unhatched Siberian eggs on the 1977 expedition. These were relayed to an ICF agent in Moscow, and immediately sent to a special hatchery at the University of Wisconsin in Madison. Of the five eggs, two survived. Ron Sauey, a co-founder of ICF, named one Vladimir after Flint and the other Kita, a Russian name for the crane.

In 1978, the operation was repeated. Four out of seven eggs hatched successfully. In 1979, the Russians hatched four chicks in Moscow which they named after ICF members.

With six young cranes and two adult ones obtained from zoos, the Foundation has a captive population of breeders which will be artificially inseminated to produce eggs. Within four years, the offspring of these rare cranes could embark on a 10,000-mile journey back to Siberia—the most promising, and perhaps last chance for their continued existence.—*Lynn Giroux, National Wildlife Federation*

American Attitudes about Wildlife

What do Americans really think about saving endangered species, hunting, and other issues that affect wildlife? The first report on a comprehensive study of American attitudes toward wildlife has revealed some interesting answers.

The report analyzes initial findings of a three-year study by Stephen Kellert of the Yale School of Forestry and Environmental Studies. Kellert conducted the study under a research grant from the Interior Department's U.S. Fish and Wildlife Service. The study is based largely on a questionnaire administered nationally in interviews with 3,107 people during the fall of 1978. The questionnaire dealt with specific issues, such as the tuna/porpoise controversy, as well as with general issues such as attitudes toward hunting.

Among the study's findings: Of eight selected wildlife issues, the public knew the most about "killing baby seals for fur" (43 percent knowledgeable) and "effects of pesticides such as DDT on birds" (42 percent knowledgeable). The least recognized issue was "use of steel shot versus lead shot by waterfowl hunters" (14 percent knowledgeable). Only 34 percent indicated that they had some knowledge about the Endangered Species Act, and only 17 percent were knowledgeable about the much publicized snail darter/Tellico Dam controversy.

On a variety of questions, a majority favored protecting wildlife even at the expense of jobs, housing, and development projects. Fifty-five percent opposed the principle of building an industrial plant on a marsh needed by a rare bird species even if the plant would help solve an unemployment problem. Fifty-seven percent disapproved of building houses on marshes used by ducks and other nonendangered wildlife. Seventy-six percent thought cutting trees for lumber and paper should be done in ways that help wildlife even if it resulted in higher lumber prices.

The public's support for endangered species protection when it would increase costs for an energy project depended on the animal involved and the nature of the project. Americans overwhelmingly supported protecting the bald eagle, eastern mountain lion, American crocodile, and an endangered butterfly. They opposed protecting an endangered plant, snake, or spider if it increased costs for an energy project. On a snail darter-type question, most people opposed blocking a hypothetical water project designed for essential uses such as drinking water, hydroelectric power, or irrigation to protect an unknown fish species. But nearly 60 percent opposed construction of a dam for "nonessential" purposes such as making a recreational lake if it would endanger a fish. In general, support for protecting endangered species depended on such factors as the animal's attractiveness, close biological relationship to humans, reason for endangerment, economic value, and importance in American history.

In a surprising finding, 77 percent approved killing whales for a useful product if the species hunted was not endangered. But on another intelligent sea mammal, the porpoise, 69 percent said they would rather pay a higher price for tuna fish than see the tuna industry continue killing porpoises in their nets. The researchers said the apparently contradictory responses may be related to the tradition of whaling in the United States.

On the controversial issue of animal damage control, the public was not altogether opposed to controlling coyotes that prey on livestock, but strongly preferred nonlethal control methods or hunting only individual coyotes known to have killed livestock. Most were strongly opposed to poisoning, and were also opposed to shooting and trapping as many coyotes as possible.

Attitudes toward hunting depended on the purpose of the hunt. The public overwhelmingly supported traditional native American subsistence hunting and also supported hunting exclusively for meat, regardless of who hunted. Sixty-four percent approved of hunting for recreation if the meat was used, but about 60 percent opposed hunting just for sport or recreation. Over 80 percent opposed hunting exclusively for a trophy.

Although some observers have linked anti-hunting sentiment with an anti-wildlife management attitude, results of the study did not support this. Sixty percent of members of humane organizations and 61 percent of those opposed to sport hunting supported government management programs to "control" populations of deer and ducks.

When asked about possible sources of funding for wildlife management programs, the public indicated stronger support for taxes on "consumptive" activities, such as buying fur, than on "nonconsumptive" uses such as birdwatching. Eighty-two percent favored a sales tax on fur clothing from wild animals; 75 percent favored entrance fees to wildlife refuges and other public wildlife areas; and 71 percent favored a sales tax on off-road vehicles. Fifty-seven percent favored increasing the amount of general tax revenues for wildlife management; the same number favored sales taxes on backpacking and camping equipment; and 54 percent favored taxes on birdwatching supplies and equipment.

Most Americans wanted to preserve wildlife values on public lands. Two thirds—including 77 percent of Alaskans—were opposed to hypothetical oil development in Yellowstone National Park if it would harm the park's wildlife. Fifty-six percent thought national forest land should be set aside to protect grizzly bears even if it resulted in some loss of jobs and building materials.

Attitudes toward many issues varied

considerably according to the respondent's age, sex, educational level, place of residence, and other factors. For example, support for protecting endangered species was strongest among the highly educated, people under 35, residents of areas with more than one million population, people with higher incomes, professionals, and residents of the Pacific Coast and Alaska. Older persons, those with less than an eighth grade education, farmers, rural residents, and Southerners were more likely to oppose protecting endangered species. On the animal damage control issue, residents of the South—not the Rocky Mountain states, where predator damage is higher—expressed greatest support for shooting or trapping as many coyotes as possible. Residents of Pacific Coast states indicated the most protectionist sentiment.

Of all regions, Alaskans were the most knowledgeable about and supportive of wildlife. Their support was based on understanding of wildlife and ecology, rather than on emotional or sentimental notions about animals. As a group, Alaskans ranked third in level of knowledge, following only Ph.D.s and those with other graduate education. They also expressed greater willingness to forego personal benefits such as recreation and jobs in order to preserve wildlife habitat and endangered species.

Rabid Bats in Texas Classrooms

Bats were not found in the belfry during a recent fly-in at the University of Texas, but they were to be found in the communications building. The recent occupation by hundreds of the animals was not taken lightly, for roughly one-third of the 100-150 captured each week were found to be rabid. During the day the animals were customarily quiet; but just one solitary bat flying about a crowded classroom was enough to create a semblance of havoc.

School administrators responded to the situation by calling in state park and wildlife experts on bats; posted instructions on how to pick up a rabid bat without risking rabies infection; advised students and faculty to clear classrooms upon discovery of a bat; and to duck when bats swooped too close for comfort. There was no report of anyone contacting rabies or being bitten during the bats' takeover of the building.

Wild Pets and Rabies

In 1977 an Oklahoma shop foreman took home a baby skunk that two of his workers had caught in the woods. Since it was still small, the foreman's wife fed the skunk with an eyedropper and often put her fingers into its mouth to keep it from choking. In moments of play, the couple allowed the animal to crawl over their four-month-old son. When word got out that a skunk was in the neighborhood, six children came over to play with it. The skunk crawled over all of them and lightly bit one girl on the hand.

Days later the skunk died. The shop foreman sensed something wrong and had it checked for rabies. The result was positive—the skunk had the disease.

In an unrelated incident, a two-year-old, descented, vaccinated pet skunk bit a man and exposed two children before it was killed and taken to a lab. The animal was also positive for rabies.

As a result of these exposures to skunks, the 15 persons involved had to undergo a total of 360 injections at a cost of $7,500, not to mention the time lost and discomfort involved. Happily all survived; but was the pleasure of owning a wild pet worth it?

Wild animals are just that—*wild*. They are not domesticated and they do not make good pets in the same sense that dogs and cats do. Outwardly, the young are as cute and fetching as any baby animal. Inwardly, though, wild pets are still untamed, and have the same wild instincts, urges, and shortcomings as their free relatives in the field.

They cause a profusion of problems depending on what kind you happen to have. Previously tame deer may attack without warning as they mature. Monkeys will bite and have even killed small children. Skunks like to nip fingers. Raccoons get into everything unless you chain them. Wild pets are unpredictable, sometimes biting and attacking for no apparent reason. Even if you can live with their uncertain personalities, the threat of rabies, especially with foxes, skunks, and raccoons, overshadows all other concerns.

A skunk owner might argue indignantly, "If I take my pet to a veterinarian for all the proper shots, why should rabies even be a consideration?" The answer to this question is as simple as it is surprising—*There is no licensed rabies vaccine for wildlife!* What protects dogs and cats does not necessarily protect wild animals. Vaccines that immunize domestic animals may even prolong or mask existing rabies infections in wild animals. In fact, live virus rabies vaccines, developed and proven to protect domestic animals for as long as three years, have actually caused rabies in wild pets—for this reason, such vaccines must never be used in wildlife.

The progress of rabies and its clinical signs in domestic animals is fairly predictable. Should a dog encounter a rabid fox, the virus in the fox's saliva will enter the dog's body at the location of any bite wound. The virus multiplies, penetrates a nerve cell, and slowly moves up the nerve at no more than 3mm per hour to the spinal cord and then to the brain. From the brain, the virus moves to the salivary glands. At this point the dog becomes dangerous—if he bites now he can transmit the disease by his infected saliva. Normal time for the virus to move from the bite wound to the salivary glands is 15-25 days after exposure. Indications of rabies in the dog include one or more of the following behavioral and physical changes: restlessness, aggressiveness, lethargy, change in vocal quality, persistent howling, paralyzed lower jaw, convulsions, profuse ropy saliva, and paralysis. Dogs usually die in ten days or less after the virus reaches the salivary glands. That is the reason for watching dogs closely after they bite someone. If the dog shows no symptoms and survives 10 days after the biting incident, it does not have the disease. The 10-day waiting period is very reliable in dogs . . . but not in wildlife.

Rabies in wild animals is considerably less predictable. An infected animal can undergo a variable incubation period where the virus remains long dormant in the wound. Furthermore, when the animal does become infective, it may not show any symptoms of the disease while still releasing great amounts of virus. No 10-day waiting period here. By the time the animal becomes ill, the person who has been bitten could be beyond help.

Wildlife may show some or none of the signs of rabies until the final stages. In general, a wild animal which shows aggressiveness or an unusual lack of fear is suspect. Raccoons in particular are dangerous because they are less likely to display furious behavior—but this is not a consistent finding either. The only constant among the signs of rabies are the inconsistencies. As in domestic animals and man, death is the usual end result of the disease in all wildlife species.

Rabies is a worldwide infection primarily affecting dogs, cats, and other carnivores, but man and all warm-blooded animals are susceptible. Canada's three main reservoirs of rabies are foxes, skunks, and bats. In Mexico, where pet vaccination requirements and leash laws are lax or nonexistent, most of the reported rabies cases occur in dogs, cattle, and cats. From Mexico through Uruguay, vampire bats comprise a huge reservoir of rabies. They infect and kill from 0.5-1 million cattle a year at a cost to ranchers of $250 million annually.

Most cases of rabies in man and domestic animals in the United States today originate from contact with an infected wildlife host—mostly skunks, bats, raccoons, and foxes. Fox rabies was once a serious problem in this country, but fox hunting and trapping, as well as habitat reduction, have probably contributed to the appreciable reduction of fox rabies cases. Rabies seems to be more associated with particular species in cer-

Hooded skunk

tain parts of the country.

Skunks are the most important wildlife reservoir in north central and south central United States and in California. Surveys have indicated that up to 15 percent of all wild skunks are rabid.

Raccoons are the most important rabies host in the southeast. Of the total U.S. reported raccoon cases in 1977, 87 percent occurred in Georgia and Florida.

Foxes are important rabies carriers in south central U.S. and the Appalachian region. Rabies is known in the majority of insectivorous bat species. In 1977, California reported 26 percent of the total U.S. cases of rabies in bats.

Species susceptibility to rabies is variable, with foxes the most susceptible, skunks, cats, raccoons, and bats next in line, then cattle, man, horses, and dogs and finally oppossums, which are quite resistant. Because rodents such as rats, mice, squirrels, chipmunks, hamsters, gerbils, and guinea pigs only rarely acquire rabies under natural conditions, post-exposure treatment for their bites is seldom justified. Of the more than 13,000 rodents and rabbits checked in 1977, only one North Dakota woodchuck was positive. In addition, no human rabies case has ever been attributed to a rodent bite.

Rabies virus is most often transmitted when the virus in the saliva enters a bite wound. The closer the bite, scratch, or abrasion is to the face, the quicker the virus will reach the brain. Infected foxes, dogs, and skunks pose a greater threat for bite transmssion because they generally have a greater concentration of virus in their saliva than other species.

Another means of transmission is by inhaling the virus. The air in bat caves can be as infective and deadly as the rabies aerosals produced in laboratories; however, the risk of acquiring the infection under these conditions is very much lower than that following a bite exposure. *(Ed. Note: "cave air" transmission has been proven in only one place, Frio Caves, Texas.)*

Other unlikely, but possible, modes of transmission include an animal eating a dead or dying rabid animal, and a sick mother infecting her entire litter by her milk, or by licking them.

To reduce the threat of rabies in man at least four control measures are possible. The first and most important is the vaccination of domestic dogs and the control of stray dogs and cats. Investigators have estimated that a 70 percent vaccination rate of dogs is sufficient to control urban rabies. In Laredo, Texas, 54 dogs were reported rabid from November 1977 to March 1978. Health officials halted the disease by initiating a massive vaccination program (13,000 dogs, 1,000 cats) and by capturing over 1,700 strays. Officials do not know what started the Laredo epidemic, but they do know that vaccination and roundup of strays stopped it before any human rabies cases occurred.

A second control measure is to reduce contact between infected wildlife hosts and man or his animals. This is difficult when recreational activities bring campers, hikers, hunters, and other outdoorsmen in to wild habitats, thereby increasing their chances for rabies exposure. Common sense, knowledge of the disease, and strictly enforced leash laws to prevent pets from running loose will all help to minimize wildlife contacts.

Third, considering the different rabies hotspots in the country, reduction in movement of susceptible wild animals from those areas is in the best interest of public health. Also, because there is presently no safe, sure way to immunize wildlife, the states should enact and enforce laws to prohibit wild animal ownership and to prevent their interstate trade.

Fourth, as wild animals are the source of most cases of rabies in domestic animals and man in the U.S. today, it seems logical to attack the source of infection—logical but not yet practical. A number of states have tried, most without success, to reduce infected wild populations by shooting, poisoning, or gassing. In Mexico, a special anti-bat campaign using anticoagulants has greatly reduced the cases of rabies in cattle. Many times, though, an innocent species ends up the loser. The black-footed ferret, for example, was nearly exterminated in parts of the United States because of poison bait set out for other animals.

Louis Pasteur developed the first antirabies vaccine in the 1880s. His regimen is the basis for our modern day treatment of the disease. Basically, a person bitten by a rabid animal takes two types of inoculations. First he receives Rabies Immune Globulin (RIG)—half infiltrated around the wound and half administered intramuscularly in the buttocks—in an attempt to destroy the virus directly. RIG is a passive immunizing agent prepared from the blood of hyperimmunized donors. Then the person receives from 14 to 21 daily injections of Duck Embryo Vaccine (DEV) plus two boosters to stimulate his own bodily production of antibodies against the disease (active immunity). The physician gives the vaccine doses subcutaneously in the abdominal region, lower back, or side of the thighs. The reason for using those locations instead of the shoulder area is to lessen the impact of soreness, swelling, and itching, which often occur. Other possible side effects from DEV are redness, headache, asthma, fever, and nausea.

A recently developed vaccine, called Human Diploid Cell Strain (HDCS), promises to be a major advance in human rabies treatment. HDCS requires only six injections to stimulate a higher antibody response with less adverse side effect than DEV. The Food and Drug Administration will probably license the new vaccine for use in the United States soon.

Pasteur once figured that no more than 16 percent of the people exposed to a known rabid animal would get the disease. Twenty-seven years ago in Iran, however, 15 of 32 persons (47 percent) bitten by a rabid wolf died. Either way, the odds are not good. Some 30,000 people in the United States each year who do not wish to chance the odds undergo post-exposure rabies treatments at a cost of about $500 per person. In many of these cases, however, treatments follow exposures which could not have resulted in the disease. The Center for Disease Control (CDC) in Atlanta has long suspected that as many as 25,000 vaccinations each year may be unnecessary. As a result, years ago CDC set up a consultative service for private physicians and health departments regarding recommended post-exposure treatment. CDC suggests that physicians consider the following criteria before prescribing specific antirabies treatments: species of biting animal, provoked or unprovoked bite, severity of exposure, vaccination status of the animal, and presence of rabies in the region.

Persons in high-risk categories such as animal handlers, wildlife biologists, veterinarians, and their assistants often elect to be immunized for rabies as a precaution. Three weekly injections of DEV in the shoulder, plus a booster later on, usually stimulate detectable antibodies. After a known rabies exposure, the vaccinated person still receives at least five additional shots.—*David E. John and Charles J. Issel, D.V.M., from* Louisiana Conservationist.

HONOR ROLL OF DONORS

Major Contributions in Support of Field Museum's Programs of Research, Education, and Exhibition

Since the November 1979 issue of the *Bulletin*, when 126 donors on the Honor Roll (gifts of $1,000 or more) were listed as contributors to Field Museum during 1979 (through August 31), an additional 158 have been added through December 31.

The grand total of Honor Roll Donors for 1979 stands at 284. This includes 147 individuals and 137 corporations and philanthropic foundations.

Field Museum depends in large measure upon the generous gifts of Members, corporations, and foundations. Because of unrelenting inflation, it has become an annual problem for all not-for-profit cultural institutions, that budgeted expenditures exceed known sources of revenue—creating the "income gap." A projected income gap in 1979 of $1.7 million was bridged—the 1979 budget was balanced—thanks to the generous donations of more than 450 corporations and foundations and almost 5,000 individual Member-contributors. We thank all of these persons and companies, and recognize the following donors of $1,000 or more, September 1 through December 31, 1979:

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February and March at Field Museum

(February 15 through March 15)

New Exhibit

"Patterns of Paradise." This major exhibit of dramatic and rare bark cloth, or *tapa*, illustrates the people and history of exotic tropical islands. See how Pacific islanders took the ancient task of making cloth out of tree bark and elaborated it into an art form of distinctive and remarkable styles. Exhibition also includes wood carvings, masks, costume accessories, and tools. Conceived and created by Field Museum's own staff. Most of the 200 artifacts are from the Museum's magnificent Oceanic collections. Exhibit curator: John Terrell. Designer: Donald Skinner. Opens March 6, Hall 26, 2nd floor.

Continuing Exhibits

"Art Lacquer of Japan." The Museum's newest permanent exhibit features more than 400 objects of exquisite lacquer art from 18th- and 19th-century Japan. Miniature landscapes, dreamlike still lifes, and mythic dragons are flawlessly carved into these lacquer ornaments, once worn by Japanese men as symbols of wealth and status. Hall 32, second floor.

"Man in His Environment." Gain a worldwide perspective of environmental problems through the multi-media presentation of this thought-provoking exhibit. The center of the hall contains, encased in glass, a re-created portion of a Georgia salt marsh, permitting a visual study of ecological principles, within a total marsh environment. Main floor.

"The Place for Wonder." This gallery allows visitors to handle, sort, and compare natural history specimens without feeling guilty. "The People Center" now features touchable clothes, household goods, and school supplies from the People's Republic of China. Weekdays 1 to 3 p.m.; weekends 10 a.m. to noon and 1 to 3 p.m. Ground floor, near cafeteria.

(Continued on back cover)

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February and March at Field Museum

(Continued from inside back cover)

New Programs

"Patterns of Paradise: Special Lecture and Tour." Field Museum's associate curator John Terrell, originator of "Patterns of Paradise" exhibition, will give an illustrated lecture on the exhibit: how the exhibit evolved, who the peoples of paradise are, what their art of *tapa* says about them, and the impact of European civilization on their lives. A tour of the exhibit follows the lecture. Tickets (Members, $2.00; non-members, $3.50) are available at the West Door before the lecture. A special wine and cheese reception for Members follows the tour ($3.00). Friday, March 14, 8:00 p.m. in Simpson Theatre.

"The Royal Dancers and Musicians from the Kingdom of Bhutan." Thirteen performers from the Himalayas, in ornate costumes, will act out stories from Buddhist legend and ancient folklore. The program promises to be rich in lively music, skillful dancing, and superb comic pantomime. Sponsored by the Asia Society's Performing Arts Program. Tickets (Members, $5.00; non-members, $7.00) may be purchased at West Door before the program. Friday, Mar. 21, at 8:00 p.m. in the Simpson Theatre. A lecture demonstration of this art precedes the program at 4:00 in Lecture Hall 1. For admission information, call 922-3136.

Weekend Discovery Programs. Free guided tours, demonstrations, and films. Check Weekend Sheet available at North Information Booth for additional programs and locations.

"Ancient Egypt." Investigate the daily life, myths, and mummies of ancient Egypt in this 45-minute tour. Meet at North Information Booth. Saturday, Feb. 16, 11:30 a.m.

"Clad in Feathes" Film Features: "A Bird of Prey: The Red-Tailed Hawk" examines this bird and its environment. "The Owl Who Married a Goose" depicts an Eskimo legend. Saturday, Feb. 16, 1:00 p.m.

"Clay Dinosaurs." Make your own clay dinosaurs and learn about these creatures' habitats. Hall of Fossil Vertebrates (Hall 38), Sunday, Feb. 17, 11 a.m. to 1 p.m.

"China Through the Ages." Examine the inventions, court life, and schools of thought of traditional China in this 30-minute tour. Saturday, Feb. 23, 1:30 p.m.

"Culture and History of Ancient Egypt." Learn about the mummification process and other aspects of ancient Egypt in this 45-minute tour. Sunday, Feb. 24, 1:00 p.m.

"Traditional China" Film Features: "China: The Making of a Civilization" covers the basic political, social, and religious characteristics of the Western Zhou period through the 5th century B.C. "China: Hundred Schools to One" examines the warring between the states and the technological and agricultural revolution between 475 B.C to 221 B.C Saturday, March 1, 1:00 p.m.

"Prehistoric People in the Lower Illinois Valley." Learn how these people adapted to their environment through the use of tools in this half-hour tour. Sunday, March 2, 2:30 p.m.

"Ancient Egypt." Saturday, March 8, 11:30 a.m.

"Traditional China" Film Features: "China: The First Empire" details the advent and expansion of China's Imperial Age (221 B.C to A.D. 220). "China: The Great Cultural Mix" covers the disintegration of the Han Empire, the formations of new dynasties, and developments in religion and art (A.D. 220–581). Saturday, March 8, 1:00 p.m.

"Ancient Ocean Environments." This 45-minute tour focuses on the underwater world of ancient invertebrate animals. Saturday, March 8, 1:30 p.m.

"Healers and Conjurers of the Northwest Coast." Investigate the ways that native healing men treat illness and disease. Sunday, March 9, 2:30 p.m.

"China Through the Ages." Saturday, March 15, 11:30 a.m.

"Traditional China" Film Features: "China: The Golden Age" covers the expansion of reunited China under the rulers of the Sui and Tang Dynasties (A.D. 581–907). "Chinese Jade Carving." A jade artisan demonstrates basic techniques of jade carving.

Continuing Programs

Winter Journey: "Whales—Mammals of the Deep." Self-guided tour examines the world of whales. Although these marine giants live in all the oceans, many species are close to extinction. Free *Journey* pamphlets are available at the North Information Booth and Museum entrances. Watch for new *Spring Journey* beginning March 1.

"The Ancient Art of Weaving." Learn about age-old weaving techniques and textile development during these free demonstrations. Monday, Wednesday, and Friday from 10:00 a.m. to noon. South Lounge, 2nd floor.

Friend or Foe? The Natural History Game. The object here is to determine which one of a pair of apparently similar specimens is harmful and which is not. See if you can distinguish a vampire bat, a headhunter's axe, a poisonous mineral, or a deadly mushroom from its benign look-alike. Ground floor, no closing date.

On Your Own at Field Museum. Self-guided tour booklets, adult- and family oriented, are available for 25c each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with scientific interests and backgrounds are needed to work in the various departments. For more information call Volunteer Coordinator, 922-9410, ext. 360.

February and March Hours. During February the Museum is open 9 a.m. to 4 p.m. Mondays through Thursdays. In March, Monday through Thursday hours are 9 a.m. to 5 p.m. Saturday and Sunday hours in both months are 9 a.m. to 5 p.m. On Fridays the Museum is open from 9 a.m. to 9 p.m. throughout the year.

The Museum Library is open weekdays from 9 a.m. to 4 p.m. Closed February 18 (Presidents' Day). Obtain pass at reception desk, main floor.

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

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Bulletin

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COVER

Samoan tapa cloth (#111354), detail, acquired by Charles F. Gunther and given to Field Museum by Stanley Field, Henry J. Patten, and Charles B. Pike. Painted freehand, the broad bands with sawtooth edges create lighter zigzag lines of negative space; 280 x 184cm (110 x 72 in.). This specimen, together with some 125 other tapa pieces and 75 artifacts of stone, pottery, wood, and other materials will be on view in Hall 26 beginning March 6, as part of the exhibit "Patterns of Paradise." Members' preview is March 5; closing date is June 8. See pages 4-11. Photo by Ron Testa.

Gold of El Dorado Group Tours

Special tours of the major forthcoming exhibit "Gold of El Dorado," opening April 25 and closing July 6, may now be arranged for groups as small as 30 persons. During public hours, daily except Friday, special groups of 30 to 100 persons can be accommodated. On Tuesday and Thursday evenings (after the Museum is closed to the general public) groups of 50 or more can be accommodated.

Supplemental lectures by Museum staff for such groups, as well as private dining arrangements, are also available. For rates and other information call Caryn Friedman, at 786-9570.

FIELD MUSEUM TOURS

1980 Tour Packages Exclusively for Members

Field Museum's 20-Day Tour of Greece
Including a Cruise to the Greek Islands
Under the Leadership of Curator Donald Whitcomb
September 7-26

For details on this tour see the April issue of the *Bulletin* or contact the Tour Office for a brochure.

Geology Tour of England and Wales
June 14-July 3

Highlights of this 20-day tour, under the leadership of Dr. Bertram Woodland, Field Museum's curator of petrology (and a native of Wales), will be visits to classical areas of British geology where many fundamental aspects of geology were first discovered. The geological history and scenic development of these areas will be emphasized. Included in the tour are visits to the South Coast, West Country Cotswolds, Welsh Borderlands, North Wales, Lake District, Yorkshire Dales, and the Peak District. The group is limited to 25 persons.

Cost of the tour—$2,640 (which includes a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare between Chicago and London. First class accommodations will be used throughout. The package includes breakfast and dinner daily, chartered motorcoach, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $250 per person.

People's Republic of China
May 10-31

The singular experience of a trip to the People's Republic of China can be yours! For its members, Field Museum again offers an opportunity to visit China's major attractions. The tour leader will be Susan Mann Jones, assistant professor of Chinese civilization, of the University of Chicago. The group, limited to 25 persons, will leave Chicago May 10 and return May 31.

After overnight in Vancouver and a visit in Tokyo, you will continue to Peking, China's centuries-old capital. Relics of the imperial past, now national monuments, include the magnificent imperial palace, museums, temples and shrines, and the vast park-like Summer Palace on the shores of nearby Kunming Lake. A trip will be made to the Great Wall. The next destination, Nanking, situated on the Yangtse River, is a source of pride for the People's Republic as a center of modern development as well as for its scenic and historic attractions. Of special interest is the visit to the charming city of Kweilin. The awesome surrounding landscape of jutting peaks and rocky caves brings scenes of Chinese painting to life. Kwangchow (Canton) is China's most important southern City, reflecting events in the history of the republic as well as former times when it was China's only port open to foreign trade.

For additional information on this exciting tour, contact the Tours Office and ask for the China brochure.

Looking across Kunming Lake to the site of the Summer Palace of the Chin dynasty, six miles from Peking. Photo by Stanton R. Cook, courtesy Chicago Tribune.

Stonehenge, site to be visited by Field Museum June 14-July 3 Tour of England and Wales. Photo courtesy Bertram Woodland, curator of petrology, who will lead the tour.

Illinois Archeology Field Trip
July 6-11

For many of us, the word "archeology" conjures up visions of great architecture in distant places: Egypt's Pyramids and Sphinx, Cambodia's Angkor Wat, and Mexico's Pyramids of the Sun and Moon at Teotihuacan. These sites, with their relics, are limitlessly fascinating.

But right here in Illinois we also have exciting archeological sites, including the largest aboriginal structure north of Mexico — Monk's Mound at Cahokia. One of the most broadly based archeological research centers in the country is the Foundation for Illinois Archeology, at Kampsville; and one of the largest covered excavations with the longest continuing research programs is at Dickson Mounds, near Lewistown.

For the second consecutive year Field Museum is offering an archeological field trip which will visit Dickson Mounds, Kampsville, and Cahokia Mounds. Limited to 30 participants, the trip includes site visits, lecture and slide presentations, workshops and discussions led by staff archeologists working at the respective sites. The field trip director is Robert Pickering, a doctoral candidate at Northwestern University.

For additional information and reservations for all tours, call or write Dorothy Roder, Field Museum Tours, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605. Phone (312) 922-9410.

Patterns of Paradise

By JOHN TERRELL and ANNE LEONARD

EXHIBIT OPENS MARCH 6

Members' Preview March 5

Lieutenant (later, Captain) James Cook, 39 years old, sailed on His Majesty's Bark *Endeavour* from Plymouth, England, on August 26, 1768, headed toward the South Seas. This was the first of his three great voyages of discovery to the Pacific. In the *Secret Instructions* issued him prior to his departure, Cook was ordered by the British Admiralty and the Royal Society to search for "a Continent or Land of great extent" then believed to lie somewhere in the southern waters. If he found this continent, he was to observe "the Genius, Temper, Disposition and Number of the Natives, if there be any, and endeavour by all proper means to cultivate a Friendship and Alliance with them. . . ."

James Cook did not find *Terra australis incognita*, the great Southern Continent which had for so long haunted the European imagination. On the contrary, he proved that it did not exist. But his three voyages to the Pacific between 1768 and 1780 nonetheless captured European thought. They helped create the romantic vision of the Pacific Islands as Paradise-on-earth that survives even today in popular thought and literature.

For three months this year at Field Museum of Natural History—starting March 6—you may yourself observe the genius of the Pacific Islanders: including museum treasures actually brought back to Europe by Cook him-

Two ranking leaders of Bellona Island, Solomon Islands, dressed in garments and turbans of dyed tapa. Photograph by W. Templeton Crocker (1933). Similar turbans collected by Crocker are still fragrant with powdery turmeric dye.

self. Most of the rare artistic and practical treasures in the new special exhibition "Patterns of Paradise" are from the world-famous collection at Field Museum. Most have never before been seen on public display.

Although to Europeans in the latter half of the 18th century the islanders of the South Pacific appeared to live in Paradise, we today know that this tropical world has been the scene of many different, often challenging, and at times cruel patterns of human experience. Moreover, since their discovery, the islanders have also suffered different, at times tragic, fates as a result of expanding European trade and industrial civilization.

"Patterns of Paradise" tells the story of the peoples of the Pacific using the medium of their surviving handicrafts. Most notable of these is a little known and largely unappreciated craft—which is also an outstanding art form: the ancient tradition of making masks, costumes, garments, and effigies out of *tapa*, or bark cloth.

This traveling exhibition—created by the staff at Field Museum and sponsored in part by grants from the National Endowment for the Arts in Washington D.C., a federal agency—displays roughly 125 dramatic tapa specimens and some 75 artifacts of stone, wood, pottery, and other materials from the Pacific and from other tropical regions. "Patterns of Paradise" is really three museum shows in one:

- The exhibition introduces you to the discovery of the Pacific Islands by European explorers, and it introduces you as well to the islanders: their inventiveness, their artistic creativity, their traditions, and their disparate history.
- "Patterns of Paradise" is the first major museum exhibition to feature a neglected medium of "primitive" art: tapa making around the world. Most of the artifacts and other items have never before been exhibited together for public showing.
- "Patterns of Paradise" also reveals how an ingenious folk craft is done; this craft offers a number of exciting technical and design ideas that can be adapted by modern artists and craftspeople.

When you enter Hall 26 on the second floor at Field Museum, where "Patterns of Paradise" is being shown, you will find that the items on display have been arranged according to four major themes: "Discovery," "Diversity," "Shared Traditions," and "Changing Artistry." Here is a brief introduction to what you will encounter as you tour the exhibition:

DISCOVERY

In 1513 the Spanish adventurer Balboa stood on a mountain-top in Central America and gazed down on a sight never before seen by European eyes: a vast ocean he named "the Great South Sea." Seven years later the Portuguese explorer Ferdinand Magellan sailed across this sea that covers one-third of the earth's surface. Finding its waters calm and peaceful, Magellan called it *Mare Pacifico*, the Pacific Ocean.

Long before Balboa and Magellan, however, the Pacific had been discovered by those

Masi *(tapa cloth). Precisely stenciled in traditional motifs and colors, this small piece of tapa was made for commercial sale through a marketing cooperative. Namuka Island, Fiji Islands, 1976; 48 x 31 cm (19 x 12 in.). Collection of Anne Leonard.*

John Terrell is associate curator of Oceanic archeology and ethnology; Anne Leonard is a researcher, Department of Anthropology.

Strikingly beautiful new book on tapa!

PATTERNS OF PARADISE

by
Anne Leonard
and
John Terrell

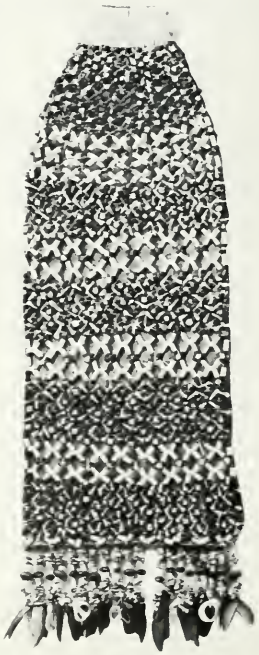
76 pages
53 4-color illustrations
75 black-and-white photos
$9.95 at the Museum Shop
(10% discount for Members)

Associate Curator John Terrell and anthropology researcher Anne Leonard with contemporary tapa piece from Moce Island, Fiji Islands, where tapa-making is today a major industry. Terrell gave this loan specimen as a wedding gift to his sister and her husband.

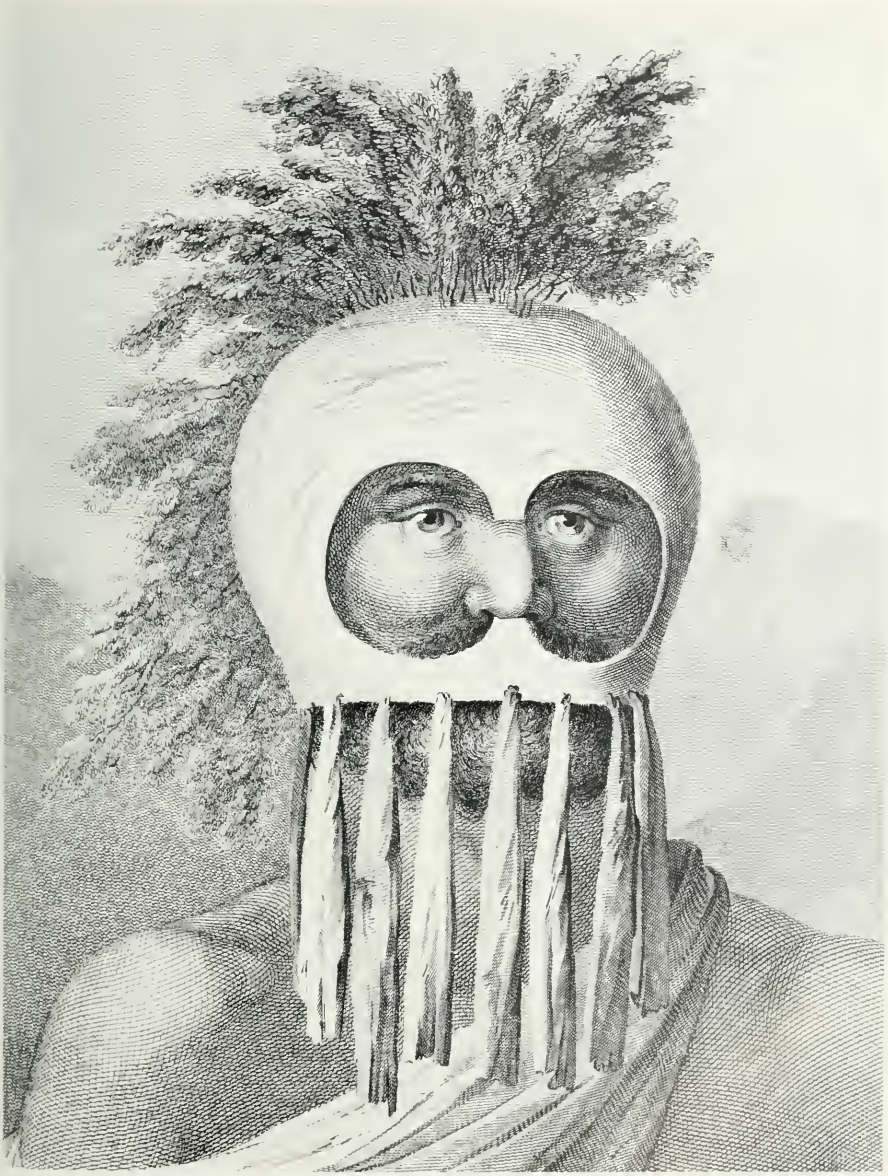
daring navigators we call the Pacific Islanders. *Tapa* making is one of the ingenious crafts developed by the islanders and by people in other tropical regions of the world. Masks, figures, costumes, blankets, clothing, hats, and other articles made of tapa reflect the many customs and patterns of daily life of the peoples of "paradise."

What is Tapa? Tapa is beaten cloth made from the inner bark of a number of species of trees. The origins of tapa making are lost in the prehistoric past. Suitable trees are found throughout tropical areas. The natural materials used dictate that tools and basic manufacturing techniques will be much the same regardless where the craft is practiced. At the time peoples outside the tropics were discovering and perfecting techniques of weaving cloth, tapa makers were also developing their skills into a human achievement of artistic and practical value.

Captain James Cook. Spanish, Portuguese, and Dutch voyagers pioneered the exploration of the Pacific Ocean in the 16th and 17th centuries. The great age of Pacific exploration, however, belonged to the English and the French in the 18th century. The most famous, most successful



Jivaro Indian (Peru) back ornament of bark cloth decorated with bird bones, monkey teeth, beetle wings, seeds, and shells (#6159). Such bird bones were said to come from birds that roost in caves inhabited by fearful spirits. Only a warrior who was himself powerful in spirit dared wear them. Collected by William E. Safford in Peru, 1891; 60 x 20.5 cm (24 x 8 in.).



A Man of the Sandwich Islands, in a Mask (*Hawaiian Islands, 1779*). *Engraving after a sketch by John Webber, official artist on Captain James Cook's third voyage. The gourd helmet is decorated with streamers of colored tapa and a crest of foliage. Rare Book Room, Field Museum Library.*

navigator of them all was Captain James Cook. He began his third and last voyage to the South Sea Islands a week after the Declaration of Independence was signed at Philadelphia in July 1776. It was on the third voyage that he discovered the Hawaiian Islands. And it was at Kealakekua Bay on the island of Hawaii itself that he met his death at the hands of the native inhabitants on February 14, 1779.

DIVERSITY

First settlement by people on the small islands of the central and eastern Pacific dates back only to around A.D. 300. Settlement on the islands of Fiji, Tonga, and Samoa, farther west in the Pacific, began sometime between 2,000 and 1,000 B.C. Scholars think, however, that people were already living on New Guinea and neighboring

An Offering before Captain Cook in the Sandwich Islands (Hawaiian Islands, 1779). Engraving after a sketch by John Webber. Cook is mantled with a tapa befitting a king or god. Rare Book Room, Field Museum Library.

islands near Asia 30 to 40 thousands years ago, if not earlier. Consequently, the farther back in time and the closer to Asia you look, the more diverse and confusing is the story of human settlement and later prehistory. The diversity of customs and ways of life among the islanders of the southwest Pacific can be seen in their remarkable creations made of bark cloth. Extraordinary diversity can also be found elsewhere in the tropics: in Asia, Africa, and the Americas.

SHARED TRADITIONS

People who live on islands are never entirely cut off from the outside world. There are many legends and reports in the Pacific about voyages between islands that are hundreds—even thousands—of miles apart. Sometimes these trips have been made on purpose. At other times, people have been driven from their intended course to some nearby island because of storms or shifting currents.

The neighboring islanders of Fiji, Samoa, Tonga, and Futuna, all located in the area of the Pacific called western Polynesia, share customs and handicrafts that reveal their common history some 3,500 years ago and their continued voyaging between their island homes for trade, settlement, marriage, ceremony, and occasionally warfare. Tapa and other artifacts from western Polynesia reflect the differences that have grown up over time among these islanders, as well as the similarities that exist among them because of tradition and travel among the islands.

Fiji Islands. Discovered by the Dutch navigator Tasman in 1643, the more than 300 islands that form the famous "Cannibal Isles" of the Fijian archipelago are richly diverse in their natural resources and in the customs and ways of life of their inhabitants. Hillsmen, coast-dwellers, outer-islanders, and Tongan migrants are all linked together by social and economic ties, in spite of their cultural differences and the ocean waters that divide them from each other. Fijian *masi,* tapa cloth, is not as varied today as it once was. Yet there are still three different styles.

Masi kesa, decorated with traditional stenciled designs, is made for personal use and commercial sale. *Gatu vaka toga,* long sheets of bark cloth in "Tongan style," is made largely for ceremonial exchange. *Gatu vaka viti,* "Fijian tapa," combines stenciled designs with "Tongan" decoration and is now made primarily for wedding ceremonies.

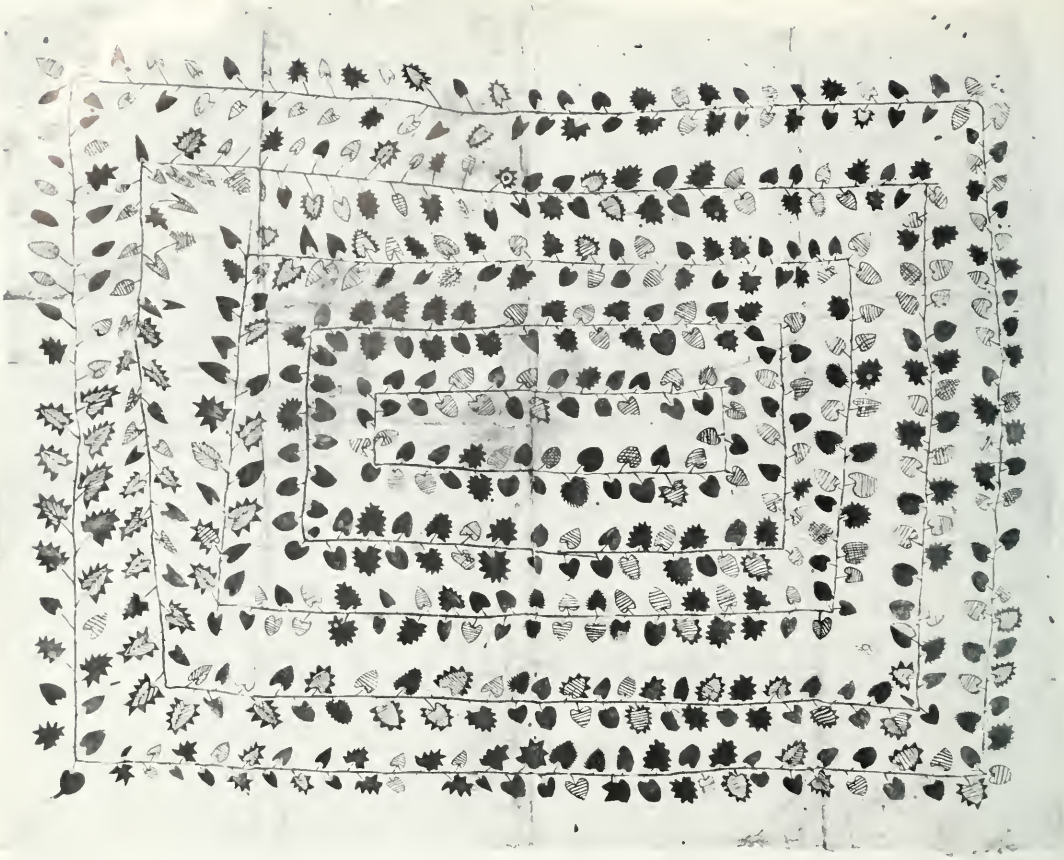
Samoan Islands. The Samoan Islanders, famous for their love of politics and social form, remain today irrepressibly Samoan in custom and tradition, in spite of decades of European influence and modern economic change. The legacy of tradition continues to shape the strong web of social ties that unites the Samoan people. *Siapo,* Samoan tapa cloth, reflects their creativity and their sense of tradition.

Tonga and Futuna. Captain James Cook named the Tongan archipelago the "Friendly Islands." He found Tongan society to be politically complex and strictly ordered by rank and nobility. Today these islands remain one of the few constitutional monarchies in the world. While social rank is still an influential force, daily life in the Friendly Islands has a warm, exuberant style that can be readily seen in modern Tongan *ngatu,* or tapa cloth. The small and proud island of Futuna also keeps its old traditions strikingly alive. Sheltered from the outside world, the Futunans have preserved their intricate and distinctive style of tapa painting in the face of modern social and economic change.

CHANGING ARTISTRY

Given time, we expect things to change to keep pace with historical events and changing conditions of daily life. Today most scholars believe

Cubeo Indian men of the Brazil-Colombia border dressed in bark cloth masks for an óyne (weeping), a dramatic mourning ceremony for the recent dead. Masked dancers impersonating familiar creatures as well as mischievous spirits come, as the anthropologist Irving Goldman has described them, "to mourn [illegible] mainly to turn people from grief." Photo courtesy of Irving Goldman.



Tapa cloth (#272722). A departure from traditional Polynesian geometric patterns, this piece was probably intended for commercial sale. Fiji or Samoan Islands; 210 x 166 cm (83 x 65 in.).

that all of the Pacific islanders are historically related to the islanders of southeast Asia. Over the thousands of years since the first Pacific islanders left Asia, however, many changes occurred throughout Asia and the Pacific. As a consequence, tapa from Indonesia and the Philippines is now often strikingly different from that made on the islands farther out in the Pacific Ocean.

Hawaiian Islands. After the death of Cook at Hawaii in 1779, the surviving officers and crew soon left the archipelago. They carried home to England the news of Cook's death and also many examples of the "curiosities" made by the Hawaiian islanders. *Kapa*, or Hawaiian tapa cloth, brought back to England in the 18th century, still can be found in museum collections. In appearance, it is thick and heavy, and painted in a variety of somber but elegant designs. By the 19th century, however, the art of *kapa* making had changed, partly because iron obtained from European sailors and traders made it possible for the Hawaiians to carve intricately designed finishing beaters (*i'e kuku*) and printing stamps of bamboo. *Kapa* from the 19th century is sheer and delicately patterned. However, by the end of the last century, *kapa* making had died out. Instead, Hawaiian women spent part of the time once given to *kapa* production in sewing wonderful quilts made out of imported woven textiles.

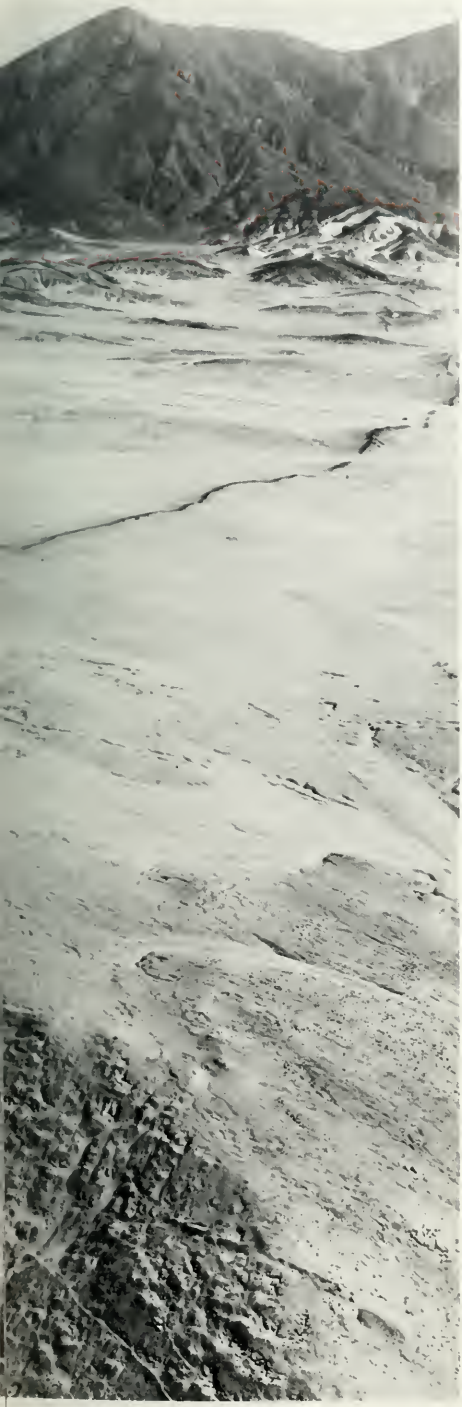
Island Southeast Asia. The islanders of southeast Asia live in worlds that vary from "Stone Age" simplicity to modern urban complexity. Bark cloth is made (or was made until recently) in many areas throughout this part of the Pacific. The diversity of local custom and life is clearly reflected in the widely varying technical and artistic sophistication shown by garments and other articles made of bark cloth.

The survival of tapa making in the future will depend on whether the people who still know this ancient craft are successful in keeping alive their own ethnic identity and how they themselves will continue to value an expression of their heritage that demands time, learned skills, and raw materials that must be carefully cultivated or somehow preserved in their wild state.

In the few hundred years during which European civilization has exported its technology and its system of values to peoples in other lands, tapa making has died out among many

A group of [illegible] of the Philippi[illegible] wearing festive [illegible] clothing. The flowers, leaves, and colored grasses that complete their headdresses were chosen for fragrance as well as for color. Palaoean Island, Philippine Islands, 1907-08. Photo by anthropologist Fay Cooper-Cole.

people for whom it was formerly not only a valuable but a valued craft. The fragile treasures of bark cloth held in museum collections bear mute testimony to the lost glories of an art that once flourished throughout the tropics. Such beautiful things, nonetheless, should be a source of pride and inspiration to the descendants of those, now dead, who made them. All of us can take delight in the artistry and skill of the tapa makers of the past and in the colorful ways in which tapa, one of the oldest creations of mankind, is still enjoyed today.



Learning Museum Program
Continues with:

Colombia: Context, Conquest, and Gold

By Anthony Pfeiffer, project coordinator

Made possible by a grant from the National Endowment for the Humanities, a federal agency

FOR MOST OF HISTORY, ninety-nine percent of Colombia's people were concentrated in 200,000 square miles of the Andes. South of Colombia, the Andean mountain chain — the world's longest and second only to the Himalayas in height — nurtured the world's highest cities with some of the greatest ceremonial centers ever discovered. Peruvian cities, for example, were so vast, their locations so magnificent, and their construction so monumental and technologically advanced that it has been suggested they were the work of visitors from space.

The great civilizations of South America, spread along a 4,500-mile chain of mountains, were human, not otherworldly. They were made possible by a diversity of habitats that are not only astounding in themselves but are made more so by being compressed into such a small area. Within the distance of a mile down a mountainside there might be three distinct ecological zones, each supporting a unique set of flora and fauna. The wealth of plants and animals translates into food for people. When 19th-century travellers went to market in certain parts of the Andes, they were amazed at the variety of foods that could be offered in one small geographic area.

In contrast to tremendous predictability and abundance in some areas, making a living in other locales was a risky business. A localized storm might wipe out a laboriously tended garden. People had to grow many gardens at many levels and were sometimes away from their villages for days at a time to

Set amidst the noble grandeur of the Andes, these prehistoric Inca ruins have a preturnatural quality that invites speculation by the space-age traveler. But more realistically, the ruins attest to the extraordinary engineering skills of that ancient civilization.

work in the lower levels. In these areas people lived above their farmlands in places so cold that early Spanish settlers remarked "even the plants have fur."

Taken as a whole, there is nothing quite like the Andean way of life elsewhere in the world. It is a way of life much more three dimensional than ours. Considered horizontally, each mountain range, each mountain within a range presented unique problems of adaptation as well as opportunities. Considered vertically, up and down a mountain was yet another set of threatening or promising possibilities.

Many great civilizations flourished in the Andes over the millennia. The fabled Inca of Peru are the most renowned and certainly the most far-flung of these civilizations. At one time the Inca empire incorporated most of the Andean chain. No such vast empires originated in Colombia. Archeological evidence suggests that the largest villages had 3,000 to 5,000 inhabitants. These and smaller villages were perhaps loosely organized into kingdoms. In interesting contrast to Colombia's low population density was the wealth of gold to be found there.

In recent times gold prices have fluctuated wildly, seemingly reaching for all time highs. Lust for this precious metal is not new. Christopher Columbus wrote:

Gold is the most exquisite of all things. Whoever possesses gold can acquire all that he desires in the world. Truly, for gold he can gain entrance for his soul into paradise.

Pectoral or chest ornament, of prehistoric Colombia (collection of Museo del Oro, Bogota, Colombia); height: 7¾ in. (20 cm). The goldwork of Colombian artisans was the finest of all South America. The prehistoric Colombians had independently devised every goldsmithing technique known to the Europeans, except electroplating.

NEH Learning Museum at Field Museum

The NEH Learning Museum program is a three-year sequence of learning opportunities focused on the Museum's outstanding exhibits and collections and designed to give participants an opportunity to explore a subject in depth.

Because of gold, a nameless 10,000-foot peak in Colombia and a lonely lake at its summit shaped the course of world history. The lake is not more than half a mile across, and as round as a wheel. Because of it, Kathleen Romoli wrote in *Colombia: Gateway to South America* (1942): "statesmen halfway round the world sat in conclave; fleets were armed in Cadiz and Plymouth and Lisbon; German bankers and English speculators made strange calculations and investments. Because of it, great captains led desperate adventures; kings gained new empires and simple people lost their gods. This is the lake of El Dorado."

The legend of El Dorado began when a Spanish conquistador was told by an Indian of a mountain place rich in gold. Although no one knows what the Indian actually said, his comment was blown up to mammoth proportions. According to the conquistador, there was a lake in this mountain, where several times a year the chief made sacrifices and offerings, "being naked, but covered from his head to his feet and hands with a sticky resin, and over it much gold in fine powder, so that...it made a second skin." Hoards of gold were said to have been thrown into the lake. Such was the tale that launched a gold rush in Colombia in 1534.

Finding the lake was easy and many attempts were made to drain it. One of the first tries was to carve the lip of the mountain cup containing the lake. Although some water drained from the lake through the wedge-shaped cut, the water level never fell off sufficiently to expose the lake's bottom. Years later, an ambitious team tunnelled beneath the lake and, although the water ran out, the remaining silt dried to the consistency of concrete. In these and other attempts, a few gold pieces were found, enough to tantalize but nothing like the billions of dollars worth expected. For centuries people flocked to Colombia, mesmerized by the dream of a kingdom of gold. If indeed untold golden treasures ever lay under the lake's still waters, they are there still.

Despite the frustrated efforts to coax the lake to yield its purported wealth, the Spanish were successful in looting the rest of the Colombian countryside for its gold artifacts. Thousands of objects were shipped to European lands and the pieces of unexcelled craftsmanship were melted to mere bullion. There was also a human price. Direct battle, slavery, murder, and most insidious and effective killer of all,

The Colombian village of San Miguel, the largest such settlement in its particular region. In former times, groups of such villages may have cooperated in the construction of stonework complexes of platforms, monumental figures, and buildings for communal religious ceremonies.

introduced disease, took their toll.

With "unbelievable daring, unforgivable cruelty, and a kind of superhuman luck," to use Kathleen Romoli's worlds, the Spanish swept Colombia. Gold mining centers were particularly hard hit. Some agricultural areas—the least prosperous—were virtually untouched. The Paez Indians, who had poor farms, were self-sufficient and lived where the land was steep and cold, as if stranded on a mountain island. They remained isolated for centuries. The Chibcha Indians, in contrast, lived in Colombia's most favorable agricultural lands. They became largely Hispanicized, gradually speaking only Spanish and worshipping as Roman Catholics.

The Colombian survivors of El Dorado gold fever and European imperialism made adjustments in their lifestyles. The Indians adopted Catholic motifs into their traditional wood carvings. European musical structure was introduced and uniquely blended with indigenous rhythms. But in an incredible testament to human resiliency, some aspects of art and music remained staunchly Andean.

In the economic realm, there were dramatic exchanges between European conquerors and native peoples. From South America, the Europeans took the common potato, which was to revolutionize the economies of Central Europe and, much later, of Ireland. Via European transmission from West Africa, South America inherited bananas and coffee, items considered almost stereotypically South American today.

COLOMBIA: CONTEXT, CONQUEST, AND GOLD examines the remarkable story of ancient mountain peoples, conquistador brutality, and the cultures and crafts of Colombia. The course of study begins on April 17 and 24 with two lectures by Field Museum staff, archeologists experienced in the Andes. It continues on May 8 with a screening of the film, "Aguirre, The Wrath of God." Aguirre, leading a Spanish military detachment in search of the mythical El Dorado, begins his quest on the Amazon River. Overcome by hostile Indians, fever, and starvation, the conquistadors succumb to an uncertain end in impenetrable jungle. The film serves as a vehicle for discussing the Spanish conquest, its motives, and ongoing legacy in South American life. Discussion is led by panelists from Field Museum and other institutions.

As the focus shifts to Colombia, the course offers three lectures by Frank R. Safford, professor of history at Northwestern University. Safford is a specialist in 19th century-Spanish America, with a particular interest in the economic and political history of Colombia. He supplements his lectures with slides of gold and pottery artifacts to illustrate aspects of social organization and to point out distinctive cultural expressions. The three lectures cover the ancient cultures of Colombia, Spanish rule and the mixture of Spanish and indigenous lifestyles, and culminate in a look at how Colombian Indian groups fare today.

Tahuantinsuyo ("Tah-won-tin-soo-yo"), performing Saturday, May 3, is a musical group specializing in folk tunes of South America. Their performance at Field Museum will include dance from the highlands of Peru and Ecuador, supplemented with background slides of life in the Andes.

"COLOMBIA: CONTEXT, CONQUEST, AND GOLD" corresponds with "Gold of El Dorado: The Heritage of Colombia," an exhibit of more than 500 gold objects that miraculously survived the Spanish scourge. This spectacular exhibit, opening at Field Museum on April 25, is the subject of a seminar available only to lecture course participants. The seminar explores the meaning of gold to the people of Colombia. Details on the lecture course and on Tahuantinsuyo's performance are available in the *Spring Courses for Adults* brochure and in April's *Calendar of Events* respectively. All Chicago-area members are on the mailing list for both publications. □

The Thorne-Graves Arctic Expedition of 1929

Questions by Irene Schultz
Response by Bruce Thorne

All photos courtesy Bruce Thorne, unless otherwise credited

The group of walruses on view in Hall N is more than likely to catch the eye of any passerby, for the diorama background is dominated by the ruddy glow of the midnight sun, and in front of it are arranged seven walruses, the largest being of near-record size. The specimens were obtained in 1929 by two young men, Bruce Thorne and George Coe Graves II.

Graves died in 1934, but Bruce Thorne is today a resident of Lake Bluff, Illinois, a Chicago suburb. The following account of the Thorne-Graves Arctic Expedition of 1929 was taped by Irene Schultz, a Museum Member who had learned only recently that her neighbor was one of those jointly responsible for the adventurous undertaking.–Ed.

Bruce Thorne (1928)

Schultz: How did you happen to go on this expedition?

Thorne: After graduation from Yale in 1928 I made up my mind that I would take one year off to travel. The first trip I took was to Alaska for big game hunting, and I went with a very close friend of mine, George Coe Graves II, whose nickname was "Toot." On my return in the fall of 1928, through a mutual friend, I met Dr. Wilfred Osgood, who was then the curator of zoology at the Field Museum. He invited me to come to the Museum so that he could show me the Zoology Department including the many animal exhibits. At that time the marine room was quite new; they only had one completed exhibit, as I recall, but they had paintings of the backgrounds for several future exhibits for which they hoped some day to obtain the specimens. One of these was to be an exhibit of Pacific walrus, and there was a beautiful painting of the midnight sun shining over the arctic ice. Dr. Osgood said, "The only trouble is, this exhibit is a long way off and we don't know when we'll ever get to it."

Well, several days later I thought to myself, "Why wouldn't it be a good idea if my partner, Toot Graves, and I went back in the fall of the next year (since I had planned to take one year off before I went to work) and obtain the walrus so the exhibit could be completed?" And so I called him to see if he would have any interest, and he did. I later contacted Dr. Osgood and told him of our interest. To make a long story short, the Museum was interested if proper arrangements could be made. We had hoped the Museum would contribute some financial backing, but it was against their policy, and we agreed to finance the expedition entirely ourselves.

So when we got back from Europe in about March or April of 1929, we started the task of organizing the expedition. Our first priority was to charter a ship. The expedition, of course, was subject to finding a ship that was suitable for the purpose of going up into the ice, and it had to have what is called "iron bark" on its hull to prevent the ice from penetrating it.

How did you know about the kind of ship you needed?

We read a lot, we talked to a lot of people. I went to Seattle and spent two or three weeks there investigating ship possibilities and checking with people like the Loman brothers, who knew arctic conditions, while Toot Graves remained in New York working through the Explorers' Club to contact people experienced in arctic exploration, like Bob Bartlett, for one. We got quite a few offers of different ships, but thorough investigation concerning the reputation of the owner and suitability for ice conditions caused us to discard most opportunities until we finally found a ship that we considered suitable. We ended up with an old 105-foot halibut schooner equipped with a 270 h.p. diesel engine with "iron bark" on its hull and very suitable for going up into the ice. It proved to be very satisfactory, but there were no comforts aboard. The expedition had no other purpose than to obtain a good representative group of Pacific walrus.

Had either of you made such a rough trip even on a shorter term before?

We had been up to Alaska a year before, and both of us always had been very much outdoor people all our lives, but neither of us had done anything like this before.

But you were familiar with arms for hunting big game?

Oh, yes. In Alaska, the year before, we spent six weeks mostly in the interior hunting sheep, goats, three kinds of bear, caribou, and moose.

What did you do after locating the ship?

The next priority was to arrange for an experienced taxidermist to prepare and preserve the specimens we obtained. The Museum could not spare one of their own taxidermists, whom we would have been delighted to have, so we hired John Jonas, one of the three Jonas brothers who were then very famous in taxidermy. On the expedition he took photographs, painted colors, and took plaster casts of the heads and hides, and he would split the skins so that they could be preserved and eventually molded to appear like the live animal itself. I think I can say that he did this very carefully and successfully.

Fleur Hale

Bruce Thorne, shown recently with walrus diorama in Hall N.

It's such a convincing group that the proof of the pudding is in the group itself. What other arrangements did you make?

After chartering the ship in Seattle, we arranged with a food distributor to buy a fairly large supply of food. The danger of going up into the ice floes north of Alaska and Siberia is that the current takes you north. If you get caught in the ice, it's possible that you would drift virtually across the North Pole and then come out on the Atlantic side—like the Nansen expedition deliberately did on the *Fram* to prove that point prior to 1900. We feared that we might get caught, so we bought a year's supply of food that would keep us alive should we get caught in the ice, as did happen to the schooner *Nanuk* shortly after we

George Coe Graves II (1928)

Graves (center) and Thorne (second from right) with plane that flew them from Anchorage to Nome.

WILL HUNT WALRUS IN THE FAR NORTH

New Yorker and Chicagoan Will Use Airplane in Expedition for Field Museum.

Special to The New York Times.

CHICAGO, May 18.—Venturing into the Far North by water and airplane, an expedition headed by George Coe Graves II of New York and Bruce Thorne, member of a well-known Chicago family, will spend the Summer on the trail of the walrus and the caribou for the benefit of the Field Museum. The expedition hopes to acquire for the museum the best groups of walrus ever exhibited. It will sail from Seattle on June 19.

Announcing the undertaking today, Stephen C. Simms, director of the museum, explained that the venture would be difficult and exciting, as walrus have to be hunted far from land, in the ice-laden ocean. The schooner to be used, the Dorothy, will probably have to cruise as far north as Wrangel Island.

Dr. Wilfred Osgood, Curator of Zoology, stated that the walrus is one of the hardest animals to prepare for preservation and that no specimen has ever been satisfactorily mounted. John Jonas, an expert taxidermist, will accompany the expedition. It is planned to mount the group in lifelike attitudes at the museum in a setting showing the Midnight Sun and fields of floating ice.

For the second stage of the hunt the adventurers will make an overland trip across Alaska from Nome to Fairbanks to reach the caribou hunting grounds, and for this the airplane will be used.

Thorne and Graves, both of whom have had big game hunting experience, are financing the expedition. They also hope to obtain polar bears for the museum.

met it off the coast of Siberia. It was a trading vessel headed for North Cape and beyond, but it got caught fast in the ice and spent the winter there. Its owner, Olaf Swenson, wirelessed us not to proceed to North Cape as we had planned, and we followed his advice.

What kinds of food did you stock?

For that purpose we bought mostly canned goods. I don't remember exactly, but we got recommendations from people who knew what was necessary to keep us alive. We also took with us certain equipment such as an outboard motor to fit onto an Eskimo umiak so that we could leave the boat in an emergency.

Can you remember some of the other things specifically that you had to provide?

Wireless equipment for one. We were able to borrow a wireless set and related equipment from the International Fisheries Commission stationed at the University of Washington. We, of course, needed this in case of an emergency and for communication in general. To reduce the cost of our provisions, equipment, and charter, the owner of the *Dorothy*, Captain Hvatum, helped us to arrange for a load of tea and other food to be delivered to North Cape, Siberia, and we had a Russian permit to deliver it. Fortunately we had a provision in the contract that if we could not get through the ice we could leave it in Nome and the Russians would pick it up there, and that is what actually happened because of the bad ice conditions I mentioned before.

When and from where did you start this expedition?

John Jonas, our taxidermist, went with the boat across the Pacific, leaving Seattle the middle of June. My partner, Toot Graves, and I took a steamship to Seward in early June and went on a bear hunt on Kenai Peninsula before we met the ship. Then on June 28 we flew from Anchorage to Fairbanks, and on the next day from Fairbanks to Nome, where we met the ship which arrived from Seattle on about July 1. We left Nome on July 3, headed north toward the pack ice.

In Seattle we had been very fortunate in employing the services of Carl Hansen as our ice pilot. He had had a great deal of experience in the arctic, having accompanied Roald Amundsen for two years on his trip through the Northeast Passage on the *Maud*. Because of this and other arctic experiences he was very informed on ice conditions, which was extremely beneficial to us. This was most important, because the ice changes with the wind, tightening and loosening. We could cruise outside of the ice floes and not be in any danger, but when we went into the ice after a group of walrus we had to watch ice conditions constantly in order to get out.

You mean going in with your ship?

Yes. Going in with the schooner *Dorothy*, breaking through the pack ice to get as near as possible to a group of walrus which had been spotted from the crow's nest. We went in as close as we could, then used an umiak, and paddled with our two Eskimos close to but downwind from the walrus. We had hired the Eskimos at the Diomede Islands after leaving Nome.

Expedition taxidermist John Jonas shaves down walrus hide aboard the Dorothy.

Bruce Thorne (left) and George Graves (third from right) with John Jonas (right) and crew members aboard the Dorothy.

Ice pilot a[illegible] Carl Ha[illegible]t) and C[illegible] Craves in [illegible] suits they w[illegible]ile repairing Dorothy's broken rudder stock.

I have to ask you about the umiak. I thought that only one person could go into an umiak. Are they the ones that fasten around you?

No. An umiak is a big skin boat—you're thinking of a kayak—an umiak is like a big rowboat, but it's made of skin. It's very light, and you can pull it over the ice, but it'll hold six or seven people.

There were two Eskimos and you and your partner, and who else might go in close to the walrus?

Usually just the four of us.

As a mother, I have to ask what your mother thought of the whole expedition, or didn't she know the extent to which you'd be involved?

Well, that is an interesting question. At the same time that I was up there in the arctic, my brother was in Antarctica with Byrd's first expedition, and he was on Lawrence Gould's three-month dog sled trip south from Little America exploring, mapping, and studying the geology of the Queen Maud Mountains, and also establishing emergency food depots for Byrd in case of trouble on his flight to the South Pole. And while he was only about 300 miles from the Pole, and I was up in the ice north of the Siberian Coast, I sent a wireless to *The New York Times* via Nome, Seward, and Seattle. *The New York Times* relayed it to Little America and Little America then shortwaved it down to my brother's base camp in the Queen Maud Mountains, and within a week I had a reply. So my mother had two sons at either end of the earth at the same time. I think she was very happy about it all though. We both communicated with her by wireless and had some communication from her too.

Did you have problems in speaking with the Eskimos who accompanied you?

No. They spoke broken English. There are missionaries on the Diomede Islands, where we obtained them, and in the winter they go over to Nome to trade. They had had a disease the year before and were very low on food and skins. I think that we helped them a great deal because all of the walrus carcasses and skins that we had and did not need for the Museum, we stored in the hold and gave to the Eskimos for their food and leather hides. They were very grateful for that.

I have been very impressed by the skill that the Eskimos have in making clothing appropriate for the weather.

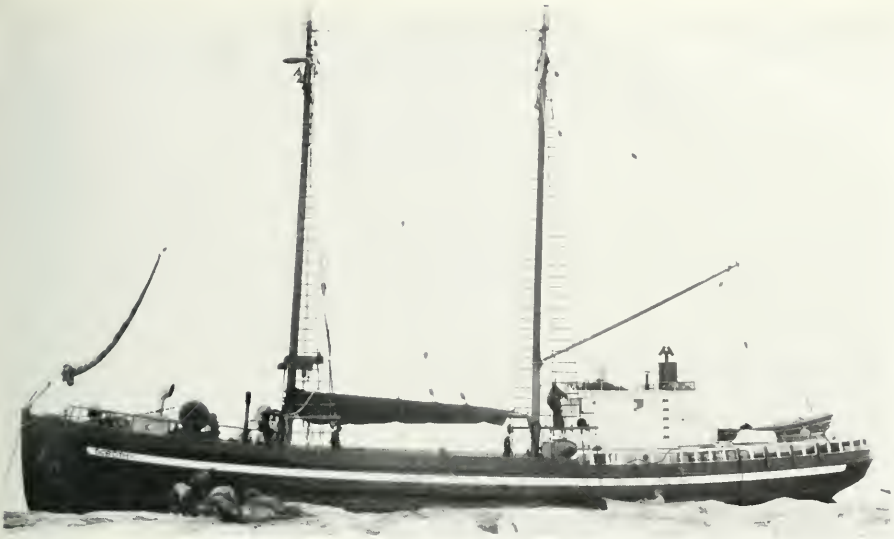
Yes. We purchased from them fur parkas and mukluks—soft sealskin boots that are quite waterproof. We were there in July when the temperatures were not low, usually being in the forties and sometimes in the thirties, but it was quite raw and we found this equipment to serve our purpose very well.

Was the captain of your ship particularly interested in your endeavor, or was he just going along as a commercial interest?

He was very much interested, but his sole function was to be responsible for the crew and the ship's operation. He had had very little experience in the ice, if any, and when we were there, our ice pilot, Carl Hansen, was in charge.

I read in your notes that your rudder broke, and I wonder what your reactions were.

Since we spent quite a bit of time cruising in the pack ice, we were often bumping into or pushing ice cakes, and one time a large ice cake bumped our stern hard and broke our rudder stock. We were then right in the ice floes north of the Alaskan Coast and the only thing we could do was to go back to Nome and get it fixed. So the captain rigged what is called a jury rudder with two or three men on either side of the boat pulling on a rope attached to the rudder so that we could maintain our course by pulling on one side or the other. It became fairly rough on the way back to Nome and this procedure was not easy. Naturally we were disappointed about this mishap as it meant we would lose about a week making repairs.



The Dorothy, the 105-foot halibut schooner that served as expedition ship.

Did you do the actual replacement?

Yes. At Nome we obtained a new rudder stock, but it was too rough to install it, so we wirelessed the Coast Guard cutter *Northland* and it arrived the next day and towed us to Teller, where a bay protected us from the weather. After using the *Northland's* lathe to reduce the diameter of the new rudder stock, Toot Graves and Carl Hansen put on diver suits and fastened the new stock to the rudder, and then we went back up into the ice again.

How many were in the crew?

In addition to our taxidermist, Toot Graves, and myself, there were 8 crew members. But it was a short crew from the standpoint of watches, and we all shared in some of these. In addition we picked the two Eskimos up at the Diomede Islands, so that while we were cruising in or near the ice there were a total of 13 of us.

Who would spot the walrus?

We'd take turns up in the crow's nest. When we saw a walrus group in the distance, that looked like a little black spot, we would cruise toward it and then go into the ice with the ship and get close enough to see whether there were any potential specimens for the Museum group. We saw many groups of walrus that didn't have suitable specimens. We were after a very large bull; the one in the Museum isn't a record, but it is counted among the record heads. And we wanted a typical big cow, and a typical middle-sized bull and cow as well as young ones so that we would end up with a typical family group, and at the same time have outstanding specimens. We looked over many walrus; we lost some; we were mistaken on some; and sometimes we would shoot one and find that one tusk would be partially broken off, and we'd have to discard that one, but fortunately it was not really wasted, because the meat would go to the Eskimos. We didn't shoot any just for the sake of shooting. We were always looking for a certain type. We searched for a big one until we got a big one; then we searched for a smaller one.

It is not difficult to kill a walrus with a high-powered rifle. But you do have to be accurate in your shooting. They have a very small brain, and I'd say you have about a six- or seven-inch diameter circle that you have to hit them in; otherwise they waddle off the ice cake and sink,

(*Continued on p. 26*)

Bruce Thorne, aboard the Dorothy, suitably attired in Eskimo parka and mukluks.

Edward E. Ayer Film Lecture Series

March and April

James Simpson Theatre

Saturdays, 2:30 p.m.

The entrance to Simpson Theatre is conveniently located inside the west entrance. This is of special interest to the handicapped, for the entrance is at ground level, with all steps eliminated. The west entrance also provides free admission to the theatre. Access to other Museum areas, however, requires the regular admission fee (except on Fridays) or membership identification. The film/lectures are approximately 90 minutes long and recommended for adults. Reserved seating available, until 2:25, for members. Doors open at 1:45 p.m.

March 1

"Holy Lands" by Charles Forbes Taylor

This nonsectarian film takes us to Damascus; places of the Patriarchs, Judges, Kings, and Prophets; the route of Moses; Bethlehem Shepherds' cave; Herod's castle, Galilee, Jacob's well, Mt. Zion, Jerusalem, Pilate's palace, Calvary, and more.

Portugal (March 22)

Land and Sea Adventure: Naples piazza (March 29)

March 8

"Exploring Darwin's Islands" by Quentin Keynes

Keynes first shows us the volcanic scenery, giant tortoises, and other unique Galapagos life. Then we step ashore on Ascension, and carry on to St. Helena, where Napoleon was exiled. In the Falklands we travel by hovercraft and see the remarkable King penguins and elephant seals.

March 15

"Norway" by Ed Lark

A country wedding, Laplanders, Europe's largest glacier, the incomparable fjords, the midnight sun are highlights of this film.

March 22

"Portugal" by Frank Nichols

Portugal today is a blend of old and new. The old can be seen in fishing villages where men dress in traditional plaids and women wear seven-petticoated dresses. The new is reflected in deluxe resorts of the Algarve.

The ever-winding Rhine (April 26)

March 29

"Land and Sea Adventure: by Freighter to the Adriatic" by William Sylvester

Ports of call Sylvester takes us to (aboard a freighter) include New Orleans, Casablanca, Genoa, Portofino, Naples, Capri, and the Yugoslavian Riviera.

Hawaiian waterfall (April 19)

April 5

"Central America" by Jonathan Hagar

Guatemala, with ancient Mayan sites; El Salvador, with coconut harvesting; Honduras, rich in mahogany forests; Panama, transected by the busy canal; Nicaragua, with views of earthquake-ravaged Managua; and Costa Rica, with its rich tablelands.

April 12

"Bavaria: Land of the Mountain King" by Howard and Lucia Meyers

We see the Passion Play at Oberammergau, visit the home of Prince Constantine, see the hamlet of Gergweis (with 500 persons and 5,000 dachshunds), and we are dazzled by a 4,000-candle spectacle at the Castle of Herrenchiemsee.

Bavaria, Neuschwanstein Castle (April 12)

April 19

"The Hawaiian Adventure" by Doug Jones

Film highlights: erupting volcanoes, waterfalls, the art of lei-making the old leper colony on Molokai, Queen Liliuokolani's palace the sugar industry, surfing.

April 26

"The Majestic Rhine" by John Roberts

From its source high in the Alps to its North Sea mouth the Rhine is one of the world's busiest and most colorful waterways—a vital artery of Switzerland, Germany, France, and the Netherlands.

VOLUNTEERS HONORED

We at Field Museum wish to express our gratitude to 260 dedicated people who committed themselves as volunteers once a week during 1979. Their total contribution of 39,791 hours represents the equivalency of 21 staff people working full time. All the departments in the Museum benefited from the volunteers' zeal and dedication. Their tasks have been varied and many, some challenging, others routine, but all needed and appreciated more than we can say.

Their responsibilities included cataloging and accessioning newly acquired specimens, photographing specimens, presenting programs to school groups and the general public, textile preparation, editing and typing, plant care, illustration, collection maintenance, exhibit researching, and other items too numerous to list. To honor and to thank the serious commitment of the 1979 volunteers a buffet dinner was given on February 20, 1980 in Stanley Field Hall. Field Museum president E. Leland Webber presented gifts to the 16 volunteers with more than 500 accumulated hours. The remaining volunteers with 100 or more accumulated hours then received gifts from their staff supervisors. The evening ended with entertainment provided by the staff.—*Vicki Grigelaitis, coordinator of Volunteer Program.*

SPECIAL RECOGNITION

Over 500 Hours

Sol Century (810 hours): Anthropology; accessioning and cataloging, general departmental projects.

Anne Leonard (713 hours): Anthropology; researching for "Patterns of Paradise" exhibit, coauthoring exhibit catalog.

David Weiss (660 hours): Anthropology; administrative assistant, responsible for overseeing loans, handling miscellaneous correspondence, special projects.

James Swartchild (653 hours): Anthropology; photographing new and previously acquired specimens for cataloging.

Gary Ossewaarde (615 hours): Education, Weekend Discovery Program; researching, developing, and presenting tours in anthropology to the public.

Carol Landow (610 hours): Education, Place for Wonder; orientating and assisting school groups and the public in Place of Wonder.

Carolyn Moore (596 hours): Anthropology; researching, cataloging, and writing labels for "Art Lacquer of Japan" exhibit, special projects.

Peter Gayford (555 hours): Anthropology; editing forthcoming book on Chinese rubbings, reconstructing "Y" cemetery at Kish, Mesopotamia, helping with maintenance of the Chinese rubbings collection.

Carol Kopeck (555 hours): Public Relations; developing and writing press releases for traveling exhibits, answering public inquiries, researching Quaker Oats project.

Connie Crane (554 hours): Anthropology; researching for the Northwest Coast and Eskimo exhibit (opening 1982), editing and checking catalog information.

Burke Smith, Jr. (540 hours): Zoology; curating walking sticks collection, processing specimen loan requests.

Margaret Martling (533 hours): Botany; consolidating and reorganizing Botany's reprint collections, helping with photograph collection, filing negatives and filling print orders.

Dorothea McGivney (529 hours): Education; orientating and assisting school groups and the public in the Place for Wonder.

Sol Gurewitz (523 hours): Anthropology; photographing specimens.

Patricia Talbot (522 hours): Geology; assisting with preparation of bibliographic and systematic text, and photographic illustrations for book on Coal Age fossil animals in northeastern Illinois.

William Bentley (500 hours): Anthropology; photographing specimens.

Over 400 Hours

James Burd: Anthropology; accessioning and cataloging, general departmental projects.

Louva Calhoun: Anthropology: illustrating and assisting with cataloging of 7,000 specimens of stone tools and other artifacts from Isimilia Prehistoric Site in Tanzania.

Miya E. Diablo: Education; Compiling Adult Education's statistical information: zip code summaries, registration information; assisting in Building Operations' numbering system.

Lorna Gonzales: Education, Group Programs; presenting school programs on Anthropology and Geology, assisting Summer Workshops.

Sylvia Schueppert: Anthropology; storage preparation of Navajo rugs, reorganizing small Chinese textiles.

Over 300 Hours

Dennis Bara: Membership; manning weekend membership booth.

Audrey Faden: Botany; organizing and maintaining greenhouse collection of research plants, assisting with illustration, proofreading, and typing.

Elizabeth-Louise Girardi: Zoology, Division of Invertebrates; Acting Head of Division, specimen processing, research on Melanesian land snails.

Viola Laski: Anthropology; researching bibliographic material and references for articles, preparing preliminary work for exhibits.

Withrow Meeker: Anthropology; accessioning and cataloging, textile identification, special projects.

John O'Brien: Education, Harris Extension; assisting in preparation of school loan materials and resources.

Elizabeth Rada: Botany; editing and typing cryptogamic papers, cataloging and filing botanical periodicals.

Helen Ruch: Building Operations; care of living plants in public areas of Museum, repotting and soil care.

James Skorcz: Library; assisting in filling interlibrary loan requests, filing cards in card catalog, compiling annual statistics, retrieving books for Reading Room visitors.

Llois Stein: Anthropology; researching and cataloging Oceanic and African collections.

Julie Ahern
Bruce Ahlborn
Victor Algmin
Mary Allan
Carrie Anderson
Cleo Anderson
Dolores Arbanas
Judy Armstrong
Beverly Baker
Dennis Bara
Gwen Barnett
Mary Barrett
Sanda Bauer
Dodie Baumgarten
John Bayalis
Curtis Bean
Virginia Beatty
Marvin Benjamin
Frances Bentley
Phoebe Bentley
William Bentley
Patricia Bercher
Ruth Blazina
Riva Blechman
Sharon Boemmel
Doris Bohl
Marjorie Bohn
Idessie Bowens
Hermann Bowersox
Susan Boynton
Carol Briscoe
Louise Brown
John Clay Bruner
Carol Brunk-Harnish
Sophie Brunner
John Brzuskiewich
Rose Buchanan
Gwen Buckun
Teddy Buddington
James Burd
Ann Butterfield
Louva Calhoun
Jean Carton
Cathe Casperson
Gilda Castro
Sol Century
June Chomsky
Jane Collins
Mary Ann Cramer
Connie Crane
Velta Cukers
Eleanor DeKoven
Sara Delahanty
Carol Deutsch
Anne DeVere
Miya Esperanza Diablo
Marianne Diekman
Jennifer Dillon
Delores Dobberstein
Margaret Dreessen
Alison Duff
Stanley Dvorak
Bettie Dwinell
Milada Dybas
Alice Eckley
Anne Ekman
Nancy Evans
Audrey Faden
Martha Farwell
Vaughn Fitzgerald
Gerry Fogarty
Gerda Frank
Arden Frederick
Nancy Frederick
Peter Gayford
Patricia Georgouses
Nancy Gerson
Jim Gibbons
Elizabeth-Louise Girardi
Lorna Gonzales
Steven Gonzales
Helen Gornstein
Evelyn Gottlieb
Carol Graczyk
Frank Green, Jr.
Loretta Green
Cecily Gregory
Paul Gritis
Kathy Gunnell
Sol Gurewitz
Bernadette Guzzy
Sylvia Haag
Dorothy Haber
Charles Hadala
Michael Hall
Elizabeth Hamilton
Marjorie Hammerstrom
John Harding
Shirley Hattis
Richard Heaps
Carol Hill
Audrey Hiller
Vicki Hlavacek
April Hohol
Claxton Howard
Ruth Howard
Adrienne Hurwitz
Diane Hutchinson
Lucinda Hutchison
Ellen Hyndman
Penny Jacobs
Judith Johnson
Mabel Johnson
Malcolm Jones
Julia Jordan
Carole Kamber
Dorothy Karall
Dorothy Kathan
Ruth Keller-Petitti
Shirley Kennedy
Marjorie King
Judy Kirby
Carol Kopeck
Judy Kurtz
John Kusmirek
Anita Landess
Carol Landow
Viola Laski
Katharine Lee
June LeFor
Marion Lehuta
Steve LeMay
Anne Leonard
Virginia Leslie
Elizabeth Linden
Margaret Litten
Elizabeth Lizzio
Edna MacQuilkin
Jean Malamud
Kay-Karol Mapp
Gabby Margo
Gretchen Martin
Margaret Martling
Joyce Matuszewich
Joan Maynard
Melba Mayo
Mark McCollam
Patsy McCoy
Dorothea McGivney
Ann Meeker
Withrow Meeker
Sister Giles Mehren
Beverly Meyer
Laura Michalik
Judi Minter
Carolyn Moore
Patricia Morris
Dorothy Morrison
Debra Moskovits
LeMoyne Mueller
Anne Murphy
Charlita Nachtrab
Mary Naunton
Isobel Neal
David Neisser
John Ben Nelson
Mary Nelson
Norman Nelson
Louise Neuert
Ernest Newton
Herta Newton
Suzanne Niven
Bernice Nordenberg
Ila Nuccio
Janis O'Boye
John O'Brien
Joan Opila
Gary Ossewaarde
Anita Padnos
Raymond Parker
Peter Paterson
Delores Patton
Frank Paulo
Christine Pavel
Mary Ann Peruchini
Barbara Preston
Sue Prybylowski
Elizabeth Rada
Karlene Ramsdell
Lori Recchia
Sheila Reynolds
Elly Ripp
Addie Roach
William Roder
Barbara Roob
Robert Rosberg
Sarah Rosenbloom
Marie Rosenthal
Anne Ross
Helen Ruch
Lenore Ruehr
Faye Ryan
Mary Kay Sabino
Linda Sandberg
Theresa Schaefer
Tim Schalk
Everett Schellpfeffer
Marianne Schenker
Marc Schlossman
Alice Schneider
Jackie Schneider
Sylvia Schueppert
Carole Schumacher
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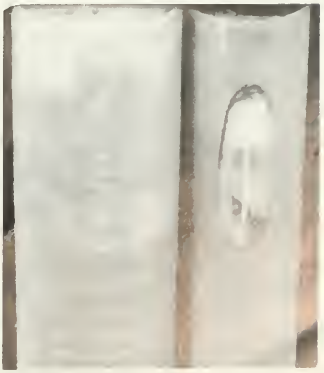
Cynthia Segal
Jean Sellar
Ann Shanower
Albert Shatzel
Louise Sherman
Jessie Sherrod
Judy Sherry
Thomas Silvestri
Abe Simon
James Skorcz
Eleanor Skydell
Burke Smith, Jr.
Beth Spencer
Irene Spensley
Steve Sroka
Monica Steckinrider
Llois Stein
Lorain Stephens
Susan Streich
Frances Stromquist
Cheri Sukowski
Marjorie Sutton
Beatrice Swartchild
James Swartchild
Dean Swedlund
Melvia Sykes
Patricia Talbot
Jane Thain
Gerda Thompson
Clare Tomaschoff
Dana Treister
Nora Tweetie
Karen Urnezis
Lillian Vanek
Barbara Vear
Harold Voris
Harold Waterman
David Weiss
Peyton Wells
Penny Wheeler
Ron Winslow
Marilyn Wodka
Reeva Wolfson
Lynn Zeger
Joseph Zeller
Faith Zieske

Elizabeth-Louise Girardi: Evolution of a Malacologist

The dirt-encrusted vials and shells shown here are from a collection of mollusks that for many years had been stored in open trays next to a soft-coal-burning furnace in Lawrenceburg, Indiana. They presented a major curatorial problem to Field Museum, since nearly 6,000 such trays of specimens required cleaning and rehousing. For Members' Night, 1964, a tray, displayed together with a scribbled sign, "shell-washer wanter," elicited numerous comments, plus one offer of volunteer help. In May, 1964, Mrs. Joseph B. Girardi spent 12 hours "rehousing specimens."

From this simple beginning to 1979, when Dr. Elizabeth-Louise Girardi acted



as head, Division of Invertebrates, during my absence on field work in Australia and New Zealand, there were changing goals, graduate study at Northwestern University field trips to several parts of the Pacific Ocean, and an increasing commitment to both research and teaching.

In Girardi's early years as a volunteer, many hours were spent in work on collection routine and assisting with phases of research. In 1966, she asked if I would write a letter of recommendation for her entry into a master's program at Northwestern University. By this time, aware of her abilities, I stated to the program head "Mrs. Girardi thinks she will get only a master's degree. She's wrong. She will go on for a Ph.D." Time proved the correctness of my forecast, and in August, 1973, her Ph.D. in biological sciences was awarded by Northwestern University. Her thesis reviewed a genus of land snails in the Museum's collection from Western Samoa. Subsequently, additional specimens were obtained from American Samoa. The study was thus expanded and revised to be published in January, 1978, as "The Samoan Land Snail Genus *Ostodes* (Mollusca: Prosobranchia: Poteriidae)," *The Veliger*, vol. 20(3): 191-250, 2 plates, 36 text-figures.

In recognition of her professional accomplishments and many contributions to the Division of Invertebrates, in August, 1977, Dr. Girardi was appointed research associate, Division of Invertebrates. Among her efforts have been untold hours of work on curation of specimens, functioning as acting head of division for a period in 1979, instigator and composer of several mollusk oriented lyrics to traditional tunes, use of divisional resources in teaching at the "Center for Self-Directed Learning," New Trier Township High School East, numerous lectures to high school and college classes and attendance at a number of national and international meetings.

Dr. Girardi's research on various snail groups continues, while her quiet advice and unobtrusive help remain an invaluable resource to our activities. It is with more than great pleasure that we give public recognition to one who has so quietly and effectively contributed to the activities of the Divison of Invertebrates for almost 16 years.—*Alan Solem, curator of invertebrates, Department of Zoology.*

Vicki Grigelatis

Elizabeth-Louise Girardi

Con't from p. 21

and they're gone. We lost a few, but not too many. We were usually on a different ice cake than the one the group was on and if there was a little swell, our ice cake was going up and theirs was going down, so we had to be pretty careful in order to hit that small target. But it's not difficult shooting. It's just a question of selection.

After the trip was over, did you find that having gone on such an enormous trip, you found that it influenced you in ways that you hadn't expected, or played a part in your life afterward?

It did influence me a great deal.

In what way?

It's hard to say, but the experience that I obtained in helping to organize and carry out the expedition successfully gave me self-confidence and a feeling of gratification for having made a lasting contribution to the Field Museum.

There's a saying that "nothing succeeds like success." And I think that particularly at a very formative age, when one is stepping over into being completely grown up, to have successful experiences is very telling.

I have always said that it's one of the best investments I've ever made, not from the standpoint of monetary reward, but for the reward of doing something that I wanted to do and having it work out the way I planned it. □

Ice pilot and navigator Carl Hansen in Dorothy's *pilot house*

March and April at Field Museum

(March 15 through April 15)

New Exhibit

"Patterns of Paradise." This major exhibit of dramatic and rare bark cloth, or *tapa*, illustrates the people and history of exotic tropical islands. See how Pacific peoples took the ancient task of making cloth out of tree bark and elaborated it into an art form of distinctive and remarkable styles. The Exhibit also includes wood carvings, masks, costume accessories, and tools. Most of the 200 artifacts are from Field Museum's world-famous oceanic collections. Conceived and created by the Museum's own staff. Exhibit curator: John Terrell; designer: Donald Skinner. Through June 8, Hall 26, 2nd floor.

Continuing Exhibits

Birds. Examine the varied world of birds from the Antarctic emperor penguin to the common sparrows of America. Three scenes show Chicago-area birds. Specimens of recently extinct birds such as the passenger pigeon and the great auk are also on view. Halls 20 and 21, 1st floor.

"The Place for Wonder." Touch, handle, sort, and compare natural history specimens in this gallery. Carefully trained Museum volunteers help guide exploration. Open weekdays 1 to 3 p.m.; weekends 10 a.m. to noon and 1 to 3 p.m. Ground floor, near cafeteria.

"Hall of Useful Plants." Survey the plants and plant products that have contributed to the well-being of people around the world. The handmade plant models are famous for their beauty and craftsmanship as well as their scientific accuracy. Miniature dioramas depict a tea plantation in Sri Lanka and a coffee plantation in Brazil. Hall 28, 2nd floor.

New Programs

"The Royal Dancers and Musicians from the Kingdom of Bhutan." Experience the magic of this Himalayan troupe making their premiere tour of the United States. Thirteen ornately costumed performers—experts in lively music, dancing, and comic pantomime—act out stories from Buddhist legend and ancient folklore. Sponsored by the Asia Society's Performing Arts Program. Tickets (Members, $5.00; nonmembers, $7.00) may be purchased at the West Door before the performance. Friday, March 21, 8 p.m. in Simpson Theatre. A special lecture/demonstration on Bhutanese dance-drama is offered by the performers at 4 p.m. on the same day in Lecture Hall I. Tickets for this event are also available at the West Door (Members, $2.00; nonmembers $3.50).

"Edward E. Ayer Film Lectures." These colorful programs are held each Saturday during March and April at 2:30 p.m. in Simpson Theatre. Narrated by the filmmakers themselves, the programs are recommended for adults. Admission is free at the Museum's West Door. Reserved seating is available for Members until 2:25 p.m. For program details see pages 22-23.

Spring Journey: "Pacific Isles: A Voyage to the South Seas." Learn about the cultures of Micronesia, Polynesia, and Melanesia through this self-guided tour. Free *Journey* pamphlets available at Museum entrances.

Weekend Discovery Programs. Free guided tours, demonstrations, and films. Check "Weekend Sheet" available at North Information Booth for additional programs and locations.

- "Northwest Coast Indian Costume." Find out how native and imported materials were used in Northwest Coast clothing to display wealth and social status in this 45-minute slide presentation. Sunday, March 16, 2:30 p.m.
- "Endangered Animals." Focus on animals in danger of extinction in this half-hour tour. Saturday, March 22, 12 noon.
- "The Vanishing People." This 30-minute slide presentation of E. S. Curtis's famous photographs reveals early 20th-century North American Indian life. Sunday, March 23, 1:30 p.m.
- "In the Land of the War Canoes." E. S. Curtis's classic 1914 film drama recaptures the life and spirit of British Columbia's Kwakiutl Indians. Sunday, March 23, 2:30 p.m.
- "Ancient Ocean Environments." Explore the underwater world of ancient invertebrate animals in this 45-minute tour. Saturday, March 29, 1:30 p.m.
- "Culture and History of Ancient Egypt." This 45-minute tour examines the Museum's collection of ancient Egyptian artifacts and concludes with a movie. Sunday, March 30, 1 p.m.
- "Ancient Egypt." Ancient traditions are examined in this 45-minute tour. Saturday, April 5, 11:30 a.m.
- "Death of a Legend." This 50-minute film looks at wolves and the mistreatment they have received from men. Saturday, April 5, 1 p.m.
- "The Ancient Etruscans." Explore the everyday life and religion of the Etruscans in this 35-minute tour. Sunday, April 6, 1 p.m.
- "American Indian Dress." Investigate the construction, craft, style, and symbolism of Indian dress of North America. Saturday, April 12, 11:30 a.m.
- "Endangered Animals." Saturday, April 12, 12 noon.
- "Bighorn." This 26-minute film studies an endangered species, the bighorn sheep. Saturday, April 12, 1 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." This 45-minute tour looks at some changes in teeth and bones that characterize the great variation in today's mammals. Saturday, April 12, 1:30 p.m.
- "Prehistoric People in the Lower Illinois Valley." This half-hour tour and demonstration shows how these people adapted to their environment through the use of tools. Sunday, April 13, 1 p.m.

(Continued on back cover)

ILLINOIS NATURAL HISTORY
SURVEY LIP RM 196
NATURAL RESOURCES BUILDING
URBANA ILL 61801

March & April at Field Museum

(Continued from inside back cover)

Continuing Programs

"The Ancient Art of Weaving." Learn about age-old weaving techniques and textile development during these free demonstrations. Monday, Wednesday, and Friday from 10:00 a.m. to noon. South Lounge, 2nd floor.

Friend or Foe? The Natural History Game. The object here is to determine which one of a pair of apparently similar specimens is harmful and which is not. See if you can distinguish a vampire bat, a headhunter's axe, a poisonous mineral, or a deadly mushroom from its benign look-alike. Ground floor, no closing date.

On Your Own at Field Museum. Self-guided tour booklets, adult- and family oriented, are available for 25¢ each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with scientific interests and backgrounds are needed to work in the various departments. For more information call Volunteer Coordinator, 922-9410, ext. 360.

March and April Hours. The Museum is open every day, 9 a.m. to 5 p.m., except Fridays. On Fridays the Museum is open 9 a.m. to 9 p.m. throughout the year.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Closed Good Friday, April 4. Obtain a pass at the reception desk, main floor.

Museum telephone: (312) 922-9410

A Young Woman of Otaheite, *engraving after a sketch by John Webber. The tapa cloth wrapped about her body was presented as a gift to Capt. James Cook, Pacific explorer. For more on tapa cloth exhibit, "Patterns of Paradise," see page 4.*

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

Gold of El Dorado

The Heritage of Colombia

April 25-July 6

Members' Preview April 24

Field Museum
of Natural History
Bulletin

April 1980
Vol. 51, No. 4

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Calendar: Mary Cassai
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Field Museum of Natural History

Founded 1893

President and Director: E. Leland Webber

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COVER

Tolima pectoral, or chest ornament. Made of cast and hammered gold. Height 19.7cm (7-3/4 in.). From Museo del Oro. One of more than 500 pieces of ancient goldwork to be seen in the exhibit "Gold of El Dorado: The Heritage of Colombia," opening April 25 and closing July 6. See p. 7. Photo by Lee Boltin, courtesy American Museum of Natural History.

The national tour of "Gold of El Dorado: The Heritage of Colombia" is sponsored by Chemical Bank, with additional support from the National Endowment for the Humanities and the National Endowment for the Arts, and has been organized by the American Museum of Natural History.

Gold of El Dorado Group Tours

Special tours of the major forthcoming exhibit "Gold of El Dorado," opening April 25 and closing July 6, may now be arranged for groups as small as 30 persons. During public hours, daily except Friday, special groups of 30 to 100 persons can be accommodated. On Tuesday and Thursday evenings (after the Museum is closed to the general public) groups of 50 or more can be accommodated.

Supplemental lectures by Museum staff for such groups, as well as private dining arrangements, are also available. For rates and other information call Caryn Friedman, at 786-9570.

FIELD BRIEFS

NSF Grant for Mazon Creek Study

The National Science Foundation has awarded a $50,000 grant to Field Museum to study the fossil-rich area around Mazon Creek and the abandoned Braidwood-Coal City strip mines about 60 miles southwest of Chicago. Gordon C. Baird, assistant curator of fossil invertebrates and Eugene Richardson, curator of fossil invertebrates, will direct the study. A team of scientists, volunteers, and amateur collectors will work together to take a fossil census, and to try to reconstruct the ancient ecology of this area which about 300 million years ago included fresh and salt water habitats around a delta which bordered a large inland sea.

"We'll try to reconstruct the particular events which took place in this 'Coal Age Pompeii' that left so many well preserved and finely detailed plants and animals," said Baird. "It is one of the most important invertebrate fossil sites in the world because many unusual soft-bodied animals are found here. These fossils are superbly preserved because the animals and plants were buried rapidly during floods and because hard nodules formed around the fossils immediately after burial. These nodules preserved such details as patterns of color and larval egg sacs.

"Although the Mazon Creek area has been studied for over 100 years, there is an urgent need to complete the work before a nuclear power plant and residential projects planned for some sites destroy their usefulness," Baird continued. "More than 500 plants and animals, many bizarre and problematic, have been discovered in the area, and I believe many more are present in unexplored areas and in some extensive private collections.

"The statistical census will be done by trained scientists, but we also want to examine private collections of amateur collectors for the rarer forms of fossils, as well as for undiscovered species. For instance, an insect is found only once in every two to three thousand fossils, and an amphibian once every 100,000 fossils. Therefore, these rare forms can be seen more often in large amateur collections than in random samples. We can also get a better idea of the relationships of the land and water plants and animals through examining nodules containing two or more species. These are much valued in private collections."

Mazon Creek fossil collecting is currently centered at Pit 11 of the Peabody Coal Company strip mine west of Essex, Illinois. Amateur collectors as well as paleontologists are allowed to collect at this site through the joint cooperation of Field Museum and Commonwealth Edison Utility Company, which now owns the property. However, half of this site is scheduled to be flooded because of the construction of a cooling pond for a nuclear power plant.

Most fossils are found inside round or oblong ironstone nodules along the banks of Mazon Creek or in the dump heaps of the strip mine areas southwest of Joliet on highway I-55. The nodules can usually be opened by hammering; this pounding will often cause the nodule to break along the plane of the fossil.

MEMBERS' PREVIEW

of

"Gold of El Dorado: The Heritage of Colombia"

Thursday, April 24, 1:00 to 9:00 p.m.

Hall 27

Refreshments to be served

NSF Summer Anthropology Course

For the fifteenth consecutive year, Field Museum offers its six-week NSF Summer Anthropology Course for high-ability high school students. Objectives of the course, which is free, are to provide a sound foundation in the various fundamentals of anthropology, to bring students into contact with scientists prominent in these fields, to enable students to gain experience in both group and individual research, and to assist students in testing a career interest.

The popular course, under the directorship of Harriet Smith, is scheduled June 23 through August 1, weekdays. The fifth week will be spent at an archeological dig. The course is made possible by a grant from the National Science Foundation.

Faculty members for the 1980 session include Phillip Lewis, cochairman of the Department of Anthropology, Field Museum; Ronald Weber, visiting assistant curator for the Northwest Coast area, Department of Anthropology, Field Museum; Ronald Singer, physical anthropologist, Department of Anatomy, University of Chicago; Stuart Struever, archeologist, Department of Anthropology, Northwestern University; John Aubrey, Ayer Documentary Collection, Newberry Library; Peter Knauss, political scientist, University of Illinois at Chicago Circle; M. Kenneth Starr, director of the Milwaukee Public Museum; Joseph Berland, cultural anthropologist, Northwestern University; William Adelman, Labor Relations Program, University of Illinois at Chicago Circle; David Keene, doctoral candidate, University of Wisconsin; and Edward Lace, naturalist-historian, Cook County Forest Preserves.

Applications for the course—which must be submitted by April 14—may be obtained by writing or calling Field Museum's Department of Education (922-9410, ext. 246). Additional information may be obtained by writing Harriet Smith, Department of Education, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605.

Trustees Elect New Officers

At the annual meeting of the Field Museum Board of Trustees, held January 21, the following officers were elected or reelected:

William G. Swartchild, Jr., chairman of the board, and John W. Sullivan, vice chairman of the Facilities Planning Committee, were reelected for two-year terms.

Robert O. Bass, vice chairman of the Resource Planning and Development Committee; Blaine J. Yarrington, treasurer of the Board of Trustees; and George R. Baker, vice chairman of the Internal Affairs Committee, were elected for two-year terms.

Reelected for five-year terms as trustees were Charles F. Murphy, Jr., James J. O'Connor, James H. Ransom, William L. Searle, John W. Sullivan, Mrs. Theodore D. Tieken, and Blaine J. Yarrington.

FIELD MUSEUM TOURS

1980 Tour Packages Exclusively for Members

Chinese schoolchildren sing in Peking's Tien An Men Square. Photo by Stanton R. Cook, courtesy Chicago Tribune

People's Republic of China
May 10-31

The singular experience of a trip to the People's Republic of China can be yours! For its members, Field Museum again offers an opportunity to visit China's major attractions. The tour leader will be Susan Mann Jones, assistant professor of Chinese civilization, of the University of Chicago. The group, limited to 25 persons, will leave Chicago May 10 and return May 31.

After overnight in Vancouver and a visit in Tokyo,you will continue to Peking, China's centuries-old capital. Relics of the imperial past, now national monuments, include the magnificent imperial palace, museums, temples and shrines, and the vast park-like Summer Palace on the shores of nearby Kunming Lake. A trip will be made to the Great Wall. The next destination, Nanking, situated on the Yangtse River, is a source of pride for the People's Republic as a center of modern development as well as for its scenic and historic attractions. Of special interest is the visit to the charming city of Kweilin. The awesome surrounding landscape of jutting peaks and rocky caves brings scenes of Chinese painting to life. Kwangchow (Canton) is China's most important southern city, reflecting events in the history of the republic as well as former times when it was China's only port open to foreign trade.

Cost of the tour is $4,295 (which includes a $500 donation to Field Museum). Advance deposit: $500 per person. For additional information on this exciting tour, contact the Tours Office and ask for the China brochure.

Illinois Archeology Field Trip
July 6-11

For many of us, the word "archeology" conjures up visions of great architecture in distant places: Egypt's Pyramids and Sphinx, Cambodia's Angkor Wat, and Mexico's Pyramids of the Sun and Moon at Teotihuacan. These sites, with their relics, are limitlessly fascinating.

But right here in Illinois we also have exciting archeological sites, including the largest aboriginal structure north of Mexico—Monk's Mound at Cahokia. One of the most broadly based archeological research centers in the country is the Foundation for Illinois Archeology, at Kampsville; and one of the largest covered excavations with the longest continuing research programs is at Dickson Mounds, near Lewistown.

For the second consecutive year Field Museum is offering an archeological field trip which will visit Dickson Mounds, Kampsville, and Cahokia Mounds. Limited to 30 participants, the trip includes site visits, lecture and slide presentations, workshops and discussions led by staff archeologists working at the respective sites. The field trip director is Robert Pickering, a doctoral candidate at Northwestern University.

For additional information and reservations for all tours, call or write Dorothy Roder, Field Museum Tours, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605. Phone (312) 922-9410.

Santorini, radiant in the Mediterranean sun, is one of many island sites to be visited by members of Field Museum's September tour to Greece.

The Classical Lands: Greece and the Grecian Isles September 7-26

Under the leadership of Dr. Donald Whitcomb, Field Museum assistant curator of Near Eastern archeology and ethnology, this tour wil visit Athens, the sites of ancient Corinth and Mycenae, Delphi, Olympia, Knossos, Santorini, the island of Rhodes, Miletus, Skiros, Piraeus, and numerous other sites of interest in the history of western civilization and art.

Following six days and five nights in Athens, the sleek luxury motor yacht *Cavo D'Oro*, with 30 passenger cabins, will take tour members across the shimmering waters of the Aegean to some of the loveliest and most historically interesting of the Greek Isles.

Cost of the tour—$3,725 (which includes a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare via TWA between Chicago and Greece. First class accommodations will be used throughout. The package includes almost all meals (all meals while aboard the *Cavo D'Oro*), motorcoach fares, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $300 per person.

Devil's Lake, nestled like a jewel in Wisconsin's Baraboo Range

Geology Tour of England and Wales June 14-July 3

Highlights of this fascinating tour—which includes sites of geologic, historic, and aesthetic interest—are Stonehenge, the 4,000-year-old marvel of prehistoric engineering; the Roman ruins at Bath; Ironbridge, on the Severn, the first iron bridge ever constructed (1777-79); the incomparably lovely Lake District; Winchester Cathedral; and many other beautiful old castles, cathedrals, and manor houses of Wales and England. Three nights will be spent in London. Leader of this tour (which is limited to 25) will be Dr. Bertram Woodland, curator of petrology, and a native of Wales.

Cost of the tour—$2,640 (which includes a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare between Chicago and London. First class accommodations will be used throughout. The package includes breakfast and dinner daily, chartered motorcoach, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $250 per person.

Cheddar Gorge, Somerset, an interesting geological formation to be visited by England/Wales tour. Photo by Bertram G. Woodland.

Wisconsin's Baraboo Range June 21-22

Dr. Edward Olsen, curator of mineralogy, will lead tour members through the Baraboo range and along the shores and hinterland of beautiful Devil's Lake. The Baraboo Range is of special interest as a *monadnock*—what is left of an ancient mountain range and which now stands out above the younger rocks and sediments. The range consists of quartzite—more than one billion years old—which, although compressed in places into vertical folds, retains the original sedimentary structures. The mountains were further modified by glaciers, forming the lake and the picturesque glens, and changing the course of rivers.

Hiking clothes are strongly recommended for the scheduled hikes. The trip is not suitable for children, but younger people interested in natural history are welcome. The cost of the Baraboo trip is $95 per person.

Gold of El Dorado
The Heritage of Colombia

April 25-July 6

Photos by Lee Boltin
Courtesy of the American Museum of Natural History

THE LARGEST AND MOST COMPREHENSIVE display of Colombian archeology ever seen in the United States will be open to public view at Field Museum, in Hall 27, from April 25 to July 6. More than 500 artifacts, the great majority fashioned from gold, come to Chicago after an initial North American showing at the American Museum of Natural History. Prior to that, the exhibit was hosted by the Royal Academy of Arts, in London. The size of the show, in number of pieces, is about eight times that of the never-to-be-forgotten "Tut" exhibit, which was also mostly gold.

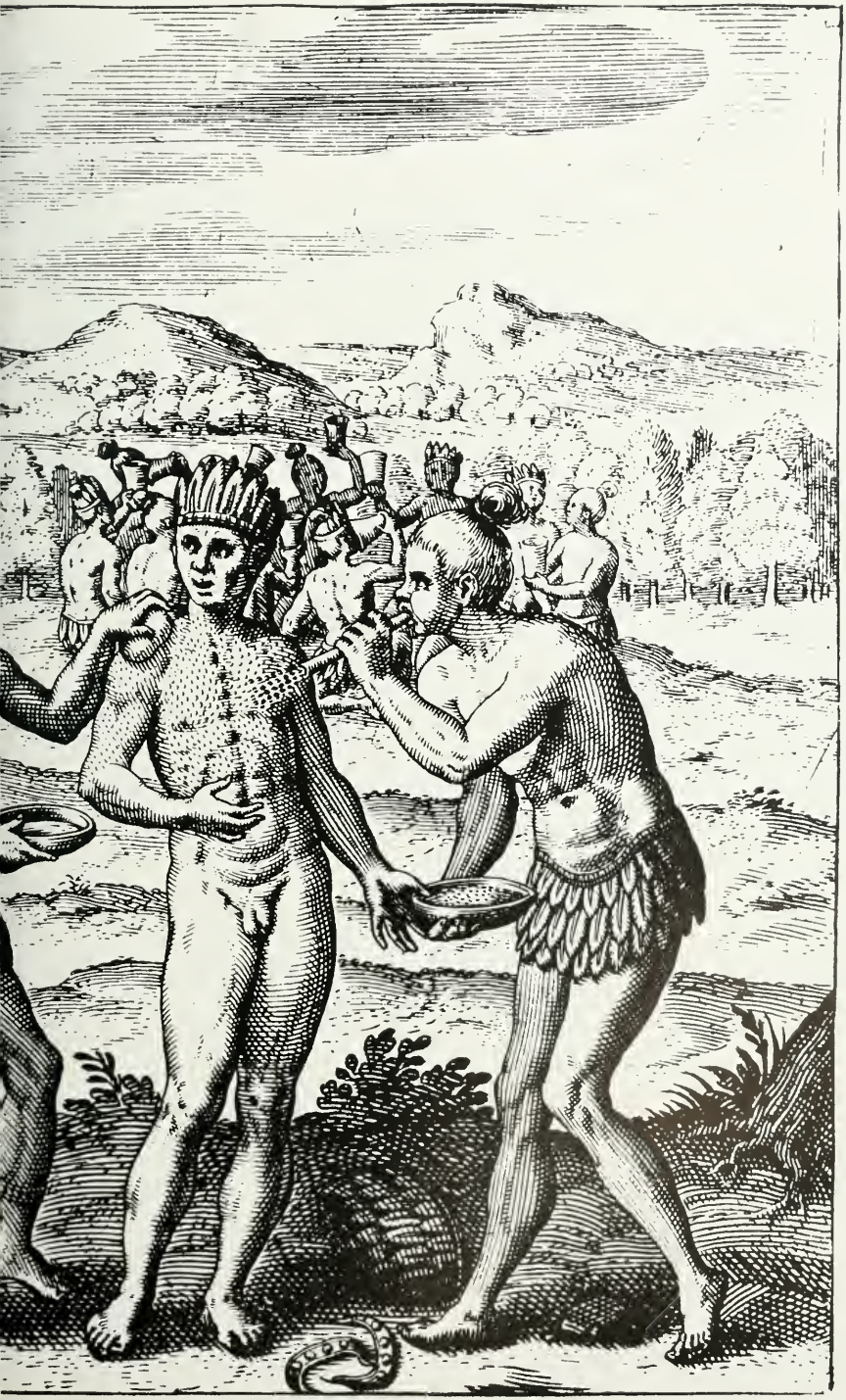
Included in the exhibit are a remarkable variety of pieces: jewelry to adorn virtually every part of the body, crowns and other regal wear, masks, pectorals (chest ornaments), bells, diadems, spear-throwers, effigies, figurines, helmets, musical instruments, bowls, flasks, jars, and other containers; also to be seen are gold coins of Spain's Charles V (1516-58) and the weaponry, body armor, and other accouterments of the 16th-century conquistador.

Text continued on page 18.

Opposite: *Quimbaya pectoral. Made of cast tumbaga (gold-copper alloy). Height 12.3cm (4⅞ in.). From Museo del Oro. The tumbaga of which this piece is made has a relatively high percentage of copper, thus its greenish cast.*

Below: *Alligator or lizard. Made of cast tumbaga. Length 13.6cm (5⅜ in.). The creatures rendered in Colombian goldwork were chosen for their symbolic value rather than for their significance as sources of food. The lizard represented knowledge, power, and social correctness.*

Annointing and covering El Dorado with gold dust. Engraving by Theodor de Bry, from Historia Americae, *Frankfurt (1580).*



Courtesy The New York Public Library

THE KENTE CLOTH OF GHANA

A Marvel of Weaver's Art

BY KAREN CHESNA McNEIL

KENTE CLOTH is a woven fabric composed of narrow strips of cotton, rayon, or silk sewn together vertically so as to produce a patchwork effect. It is made throughout West Africa, but the kente cloth produced by the Ashanti people, of Ghana, is particularly well known for its exceptionally fine craftsmanship, complex abstract designs, fine weave, and bright colors. An exceptionally beautiful example of Ashanti work is that shown opposite.

This piece was hand-woven in the workshop of Mrs. Mary Asare (a relative of the late master weaver A. E. Asare) and bears the label "A. E. Asare & Co., Dento Mills, Nsawam, Ghana." It was collected for Field Museum in 1966 by Professor Roy Sieber, a specialist in African art at Indiana University, Bloomington. Although the date this cloth was woven is unknown, its excellent condition suggests that it may have been made not long before Sieber acquired it.

Many qualities common to African art are to be seen in this piece. Its design is completely geometric, as opposed to naturalistic. To the touch it is cool and smooth, while to the eye it is exciting. The equilibrium and offbeat rhythm so often found in the art of West Africa can be sensed in this piece with its variety of colors, shapes, and textures. While there is nothing static about its design, all the elements seem to be in balance.

The cloth is made of brilliantly hued rayon, machine spun and synthetically dyed. Its colors are bold: red, green, yellow, electric blue, and silvery white; a more subtle purple shade has been achieved by combining a red weft with the blue warp. A surface tension has been produced by alternating dark with light bands. Further contrast is added by reversing the order of the yellow and green stripes of the block designs found at the ends and in the main body of the cloth.

Large smooth warp-faced areas contrast texturally with the smaller rectangles of raised weft designs. With their offset arrangements they also create a rhythmic patchwork effect. Stripes, bars, rectangles, trapezoids, and checkered patterns contribute further to this interplay of elements in elastic tension as vertical warp stripes contrast with horizontal weft elements, rectangular bars are juxtaposed with trapezoids, and barred and striped blocks form interpenetrating zig-zags in the border areas.

The quality of high visibility—notable in African art as a whole—appears in the traditional white outlining of the brocaded blocks. Rayon threads give the piece luminosity. Symmetry can be found in the sequence of colors and sizes used in the warp strips and the weft designs. Only the arrangement of the cloth strips appears asymmetrical. Elements on each are different so that the cloth does not mirror itself when folded in half vertically. This piece, however, is but a sample of kente cloth. In a finished work perhaps more strips would be added, giving the piece the appearance of greater symmetry.

Measuring 76½ inches (including a ½-inch fringe on each end) by 20¾ inches, this piece is considerably smaller than the 96-by-60-inch dimensions of a traditional man's cloth. It is, nonetheless, surprisingly heavy, a feature largely attributable to the extra weft threads introduced in the tapestrylike areas. The piece consists of five strips approximately 4½ inches wide joined by a sewing machine with a zigzag stitch. The rectangular areas that are completely covered with a supplementary weft tend to be ⅛ to ¼ inch narrower, for this inlay technique pulls the warp thread closer together.

It is a common practice of the Ashanti to name a kente cloth for its particular warp pattern, a custom that may have originated long before supplementary weft patterning became an extensively used technique and covered the warp as it does now. Weft designs are also given names. In the case of warp as well as weft, the name can describe the pattern, be based on a proverb (to which the color provides the key), or refer to a personal experience of the weaver that occurred while the cloth was being made; the cloth is never named for the type of occasion on which it is to be worn or presented.

According to tradition, new patterns, color combinations, cloth names, and—where applicable—proverbs symbolically represented are submitted to the *asantehene*, or tribal chief, for his approval. While the rights to all the Ashanti kente patterns are held by the asantehene he may on occasion award a pattern to someone he favors. A pattern can thus come to signify social

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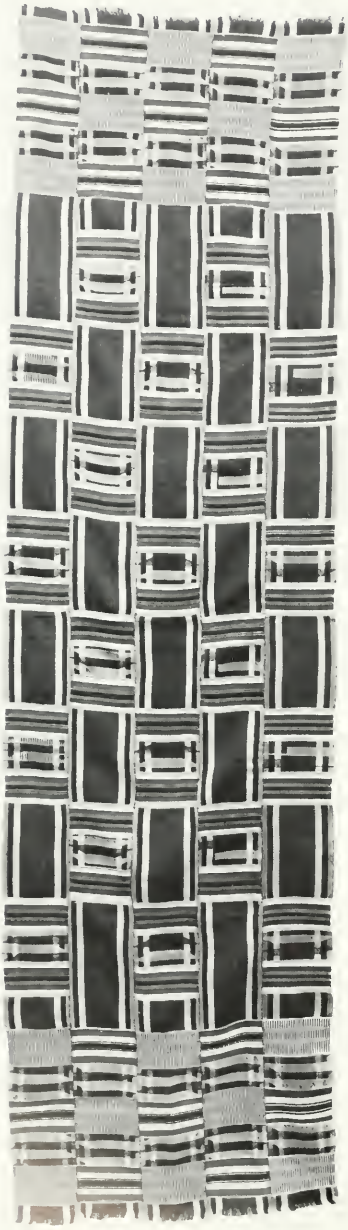
Karen Chesna McNeil is a technical assistant in the Department of Anthropology.

Full length of kente cloth of which detail is shown, in color, on page 10. The full size is 76 1/2 x 20-3/4 inches (194.3cm x 52.7cm).



position, clan membership, or sex, as well as symbolically represent a proverb or object.

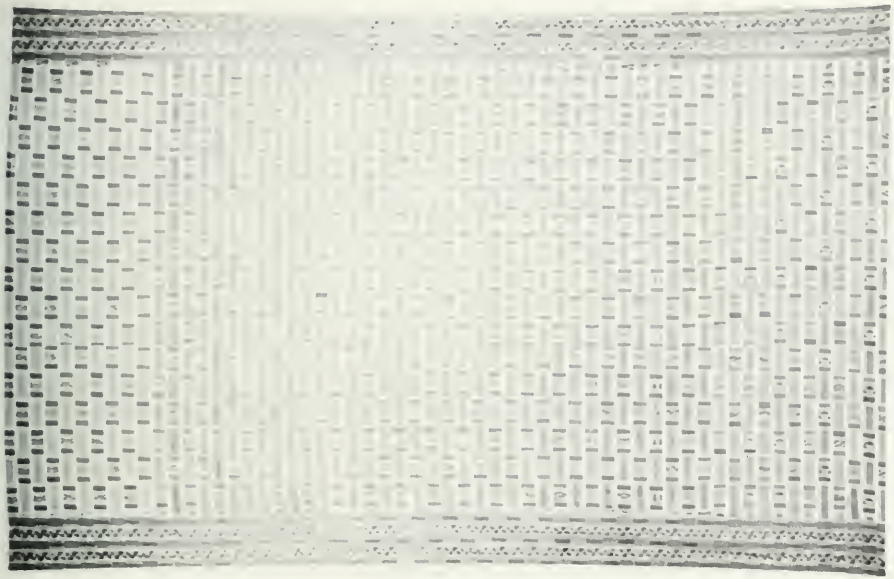
The cloth shown on page 10 is not representative of any particular family or clan; it may, however, relate to the proverb *Obi nkyem tra ye tra na:* "It is not easy to stay with someone." This saying is typical of the Ashanti, for whom money and the family's economic welfare are of particular importance. In large extended families, the wealthiest are obligated to support the poorest. Thus, proverbs concerned with family tensions, such as "family is war" or the one represented in this cloth, referring to marriage, are common.

Traditionally, five brocaded blocks of three different patterns mark the beginning and end of each strip in a kente cloth. They appear in the order *ABCBA* in one strip, *CBABC* in the next, *ABCBA* in the next, and so on. In this cloth the designs are *nsatia,* or "fingers"; *nnowötoa,* or "snail's bottom"; and *babadua,* a tree common to the Ashanti region. Cloths which incorporate *nnwötoa* and *babadua,* the most commonly used border designs, are rather expensive because they completely cover the warp and thus require much time to weave. *Nsatia,* which requires less time to produce, is frequently used on the less expensive cloths. Generally, some of these end designs are also put into the main body of the weaving.

Kente cloth made for sale is created solely by professional male weavers who have gone through an apprenticeship. Each weaver makes or buys his own loom and tools, lays out the warp, and completes the cloth. Women and girls are in charge of preparing the fibers. They plant, harvest, and spin the cotton. In former times, when silk could not be obtained by the spool or skein it was their task to obtain thread by unravelling it from silk trade cloth.

Even until today the Ashanti have continued to honor certain taboos against weaving by females. (The fact, however, that the cloth shown on page 10 was made in the workshop of a woman suggests that such prohibitions are not as strict today as in former times.) A woman's menstrual period, it is suspected, will either interfere with the actual production of a cloth or cause "undesirable forces" to form around the unfinished product. During her menstrual period a woman may neither touch a loom nor speak directly with her weaver husband; any communication with him must be done through someone else, preferably a child. Other taboos, such as that against beginning a weaving on a Friday, are also still observed today.

Much conflicting information is to be found concerning the historical development of the kente cloth. According to one legend, weaving was taught about 1700 to two farmers of Bonwire, Ghana (now the principal weaving center), by a spider, Ananse. After studying Ananse's web the two men duplicated the technique in black and white cotton and presented a finished cloth to their leader, Asantehene Nana Osei Tutu. This tradition of black and white



Kente cloth on permanent display at United Nations headquarters. Photo courtesy United Nations/Y. Nagata.

weaving continued until around 1900 when, during the reign of Asantehene Nana Agyemen Prempeh, colored yards became available. The first colored cloth was supposedly called Oyokoman in tribute to Prempeh's clan, the Okoyo.

Another authority suggests that the kente weaving tradition started much earlier, that caravans brought silk fabric and dyes into the Ashanti territory from the Near, Middle, and Far East some five centuries ago. These items inspired Asantehene Oti Akenten, who had a flair for color and design, to make this type of cloth. It is for him, supposedly, that kente cloth is so named. Whatever its origins, most authorities agree that the cloth as we know it today developed from a band-woven black and white or indigo and white cotton fabric, and that the bright colors were introduced only after the arrival of the Europeans.

Traditionally the kente cloth was a prestige item worn only by Ashanti royalty. Thomas E. Bowdich describes in his *Mission from Cape Castle to Ashantee* (1817) seeing an asantehene with a heavy, brightly colored cloth worn like a toga over his shoulder. Today in Ghana the kente cloth is a national costume worn by wealthy men and women on special occasions. A man still wraps it—a single piece—around his body and over his left shoulder like a toga. The woman's costume consists of two identical cloths. One cloth is cut and fashioned into a long dress while the other is worn as a shawl or used to hold a baby on the back.

But kente cloth has a number of other uses as well. Two-inch-wide pieces serve as sashes, hair bands, and decorative ornaments. Several four-inch weavings may be combined into shawls, place mats, bags, skirts, table runners, pillow covers, and so on. A 602cm-by-384cm (19'9" x 12'7") silk cloth (shown above) woven in green, yellow, and maroon on a blue background and designed by A. E. Asare, required for its production the labor of 10 men for three and a half months, and was presented in 1960 to the United Nations, in New York. It may be seen there today, on permanent display, in the Delegates' Lounge. □

Supplementary Reading

Hale, Sjarief. "Kente Cloth of Ghana," *African Arts*, Vol. 3, Spring, 1970.

Kent, Kate P. "West African Decorative Weaving," *African Arts*, Vol. 6, Autumn, 1972.

Sieber, Roy. *African Textiles and Decorative Arts*, New York: Museum of Modern Art, 1972.

Smith, Shea Clark. "Kente Cloth Motifs," *African Arts*, Vol. 9, October, 1975.

Thompson, Robert Farris. *African Art in Motion*, Berkeley: University of California Press, 1974.

OUR ENVIRONMENT

Red Wolf: Our Most Endangered Mammal

The red wolf *(Canis rufus)* probably no longer roams free in the wild, according to the U.S. Fish and Wildlife Service (FWS). Much smaller than its close relative, the timber wolf, this slender 40-to-80-pound, sometimes reddish wolf has the dubious distinction of being America's most endangered mammal.

Red wolves once ranged throughout the southeast and parts of Illinois and Indiana. But today, at most only 40 survive, in a Tacoma, WA zoo and holding pens in nearby Graham.

Very early in this century, soon after the American West was "won" and the land was still in need of "taming," a federally-sponsored predator control program was initiated to assist stockmen in their fight to protect cattle and sheep from wolves and coyotes. Among the "varmints" to succumb to the federal trappers was the red wolf.

Even before the predator control program, the wolf's range had shrunk from the entire southeast to a belt of southern states including eastern Texas and Oklahoma. Tragically, the red wolf's ever-shrinking population went unnoticed for decades. Only by the 1960's did anyone become concerned over the red wolf's plight.

In 1962, Howard McCarley, a biologist with Austin College, suggested that the wolf was much less common than realized, and perhaps even threatened in Texas. FWS officials discounted his warning. Its predator control agents had reported trapping over 2,700 red wolves in Texas in 1963, and they appeared as common as ever. The agency was sure these were red wolves because it thought coyotes didn't occur in the same area. McCarley found instead that nearly all the "red wolves" killed by the federal agents were, in fact, coyotes. His study, and later studies by Canadian zoologist Doug Pimlott, showed that the range of the red wolf had shrunk dramatically, and at most, only a few hundred survived in the wild, limited to a small range on the Texas-Louisiana border.

Protection for the red wolf finally came in 1966, when the species was declared endangered, and a red wolf recovery team, composed of state and federal wildlife experts, was formed.

Even in a swampy habitat, inhospitable to man, the remaining wolves were not free from extinction pressures. Habitat change was a continued threat in the Texas-Louisiana region, and external and internal parasites plagued the population. But the greatest threat to its continuation as a distinct species was and is the red wolf's close kinship with coyotes and domestic dogs. As man altered the wolf's habitat, the more adaptable coyote was able to expand its range into what had been red wolf territory. As their numbers dwindle, red wolves looking for mates are forced to accept coyotes or occasionally feral dogs when none of their own kind can be found.

A red wolf-coyote or red wolf-dog mating produces fertile hybrid offspring. The behavioral and physical characteristics that make a red wolf a red wolf, and not a coyote or dog, fade with successive inbreedings involving hybrids, coyotes, and dogs. The eventual result is extinction through the complete genetic absorption of the red wolf.

As dismal as the red wolf's situation seems to be, one hope remains for its continued existence. The hope is an ongoing captive breeding program begun around 1974 by the FWS and the Tacoma Point Defiance Zoo. This zoo was selected for the captive breeding program because the staff had much experience with canids, and the region is free from the heartworm and hookworm parasites that plagued the wolves in Texas and Louisiana. The zoo hopes to breed pure red wolf strains through careful monitoring of the genetic purity of captured wolves, and pairing of pure red wolf adults.

Distinguishing a hybrid wolf from the real thing isn't a simple matter, though. Curtis Carley, endangered species biologist and red wolf expert with the FWS, uses a set of 25 criteria to carefully evaluate a wolf's genetic heritage.

Unhybridized wolves and coyotes differ visibly in size. For example, a large male wolf outweighs a large male coyote by almost 50 pounds, and even the smallest possible male wolf has at least 15 pounds over a coyote Goliath. However, such easily observable distinctions become hopelessly clouded upon hybridization. Carley likens the difficulty of distinguishing pure wolves from hybrids to the breeding of a poodle and a cocker spaniel, saying, "Some of the mixed-breed pups can look just like a poodle, and some other may look just like a cocker spaniel."

Most important among the 25 characteristics Carley examines are: hind foot and ear length, shoulder height, and various x-rayed skull measurements including frontal bone slope, brain case position, and jawbone structure. For example, comments Carley, some hybrids may have the upper jaw of a wolf and the lower jaw of a dog, which causes the jaws to fit incorrectly.

It's ironic that the skulls used as models for measurements come from the Smithsonian Institution, where they had been sent by those same federal trappers who played a role in the wolf's decline!

However carefully screened the wolves are, the real proof of genetic purity comes only through the birth of pure red wolf pups. No one had even seen a red wolf pup until the first ones were born in captivity at the Point Defiance Zoo in May, 1977. However, as a final check, the pups still must pass the 25-point checklist when mature at 9 to 12 months to be certified as the "real thing."

This year, the third that red wolf pups have been born in captivity, 15 pups out of six litters survived, with half of them believed to be pure wolves. With four to six pups normal in a litter, the number surviving this year implies significant pup mortality. Cannibalism of diseased or weak newborn pups by their parents is the suspected cause. Dave Peterson, head of the red wolf recovery team, says he is uncertain whether this behavior is normal or a phenomenon of captivity.

Overall, the team is pleased with this year's success in captive breeding, as six of nine possible pairs bred. Wolves taken from the wild may take several years to breed in captivity. "The females are especially nervous, and may abort young," says Carley.

Fed a commercial dog food and paired in pens with ample natural vegetation and freedom from human disturbance, the wolves seem content. Carley remarks that, "The captive wolves get into group singing, howling, and carrying on." These group antics may seem to stereotype the red wolf as a pack animal like the timber wolf, which hunts in packs in order to bring down large prey like moose. However, the red wolf selects small prey species, and therefore hunts in pairs or small family groups. "It doesn't take ten wolves to bring down a marsh rabbit," jokes Carley.

Breeding captive red wolves, no matter how successfully, is not the final solution to the red wolf's predicament. Mere preservation of the red wolf in captivity, where natural selection pressures do not operate, may only prolong its decline. A genetically inferior wolf could result after a few generations. Despite survival risks for transplanted animals, translocation—the reestablishment of wolves in a suitable habitat—needs to be the goal of a breeding program. A suitable release site is one where humans, coyotes, dogs, and livestock do not present a problem, and that includes adequate food, water, and cover. The number of sites meeting these criteria are limited, however, constraining the scope of translocation efforts.

While the FWS continues its search for suitable southeastern translocation sites, Bulls Island, SC, a part of the Cape Romain National Wildlife Refuge, has already been the site of translocation experiments involving mated pairs of red wolves. Such transplants allow biologists to study under controlled conditions the little-known behavior of the red wolf; establishment of a viable population was not their objective.

A mated pair offers the most chance for success in reestablishing a red wolf population, so for the Bulls Island trials, a pair named Buddy and Margie became the first experimental red wolf Adam and Eve. Initially the pair fared well, until Margie, spooked by something unknown, suddenly left the island and swam to the mainland. She later died of a uterine infection, and Buddy was subsequently returned to Tacoma.

That translocation of red wolves is indeed possible has been demonstrated by a second released pair named John and Judy, who stayed on the island for almost a year. The male, apparently enjoying the island's abundant marsh rabbits, gained 13 pounds. The lengthy duration of John and Judy's stay has provided a wealth of information on red wolf habits, increasing the probability of success in later translocation efforts.

Finally, perhaps the most difficult impediment to reestablishing the red wolf in the wild remains: man's attitude toward wolves. A site for reintroduction can't be selected without consent of the area's responsible political bodies, and, in turn, their constituents. Hopefully, the fear that made eradication a goal of predator control will become extinct, instead of the red wolf.—*George J. Maurer, National Wildlife Federation.*

New Federal Regulation Encourages Captive Breeding of Endangered Species

A marked increase in captive breeding of endangered species is the anticipated result of a new regulation issued by the Department of the Interior's U.S. Fish and Wildlife Service. The rule eases federal regulation of interstate transfer of certain captive species covered by the Endangered Species Act of 1973.

The action was prompted by evidence that stringent regulatory procedures have led to decreased breeding by zoological parks, bird breeders, and others. Breeders have pointed out that tough federal restrictions—while intended to protect and propagate such species—have sometimes had the opposite effect. In some cases, persons who would otherwise breed endangered species have ceased to do so or have limited the number of offspring produced because they could not be readily transferred to other facilities.

Under the new regulation, a zoo, wildlife park, aquarium, and other organizations or individuals can register with the Fish and Wildlife Service to become a licensed shipper and receiver of captive-born endangered species. After registration, reports will be required annually.

Wildlife affected by the regulation includes non-native U.S. endangered species and native U.S. endangered species that are sufficiently protected from unauthorized taking or are in low demand. The rule provides that native species will be designated on a case-by-case basis. One species, the Laysan teal, was designated in the rulemaking.

Formerly, breeders were required to obtain a federal permit before engaging in interstate commerce or exporting of captive-bred wildlife. This time-consuming process led to higher maintenance costs of animals awaiting shipment, increased difficulties in handling adult animals instead of young ones, and unavailability of breeding stock when needed.

The Fish and Wildlife Service determined that activities involving captive wildlife should be regulated as required by the Endangered Species Act, but only to the extent necessary to conserve the species. According to service biologists, the new regulation should help reduce inbreeding—which has been cited as a factor in juvenile mortality — by facilitating exchange of animals. It is also hoped that the rule will reduce the demand for wildlife that might otherwise be taken from its natural habitat.

Fallout Linked to Sheep Deaths

Ranchers in Nevada are going back to court to fight a battle they lost in 1956 over government reparations for 4,200 sheep lost near an atomic testing site. A newly-released private report by a former member of the Atomic Energy Commission's (AEC) Fallout Studies Branch has scientifically connected the deaths of the sheep, which were wintering 50 miles from the testing ground, with the radiation fallout. The earlier case had been lost because government scientists claimed there was no connection between the deaths and the fallout, stating that the sheep had died of natural causes. The report also noted that some of the sheep had been grazing in areas where the reported fallout was within safety levels set by the AEC.

Throw Another Log on the Fire

Wood now provides Americans with half as much energy as nuclear power does, according to the Department of Energy. Since the 1973-74 oil embargo, the use of wood as fuel has expanded nearly 15 percent a year. Between 1972 and 1977, the number of woodburning stoves in use has increased from 250,000 to 2,000,000. One-fifth of the homes in Northern New England rely on wood as their primary heat source, and 30 percent more use it as a supplemental source.

Kenya Large Mammal Census

A Canadian aid program, the Kenya Rangeland Ecological Monitoring Unit (KREMU), has recently completed its first aerial count of selected species of animals. It reports that there are 60,000 elephants in Kenya, compared with a count of 167,000 made by a game biologist in 1973.

The loss of 100,000 elephants in five years correlates closely with World Wildlife Fund figures obtained from the sales of raw ivory recorded in customs and excise figures in various countries. In 1976, 280 tons, or the tusks of 23,000 elephants, were sold as raw ivory from Kenya, according to the Fund in Kenya.

The rhino, whose horn is regarded by many peoples in undeveloped countries as an aphrodisiac, is much nearer extinction than the elephant. KREMU counted only 1,800 rhinos in Kenya, compared with 11,500 in 1963. Since then, 52,800 lbs. of rhino horn from 11,000 rhinos have been exported from Kenya, according to customs records.

How to Spruce up Those Hard-to-Reach Feathers? Try an Ant or Two

Crows as well as blue jays and magpies, and probably other birds as well, practice a curious skill known as "anting." Anting consists of picking up ants with the beak, squashing them and then rubbing them into the feathers that are not often reached by regular grooming practices. The ants are usually those which eject either acidic or pungent anal fluids when squashed.

The purpose for all this? Apparently, say some experts, it's to kill or drive away many of the harmful parasites which infect birds. Crows in captivity sometimes also use smoldering cigarette butts to keep pesky parasites off their plumage.

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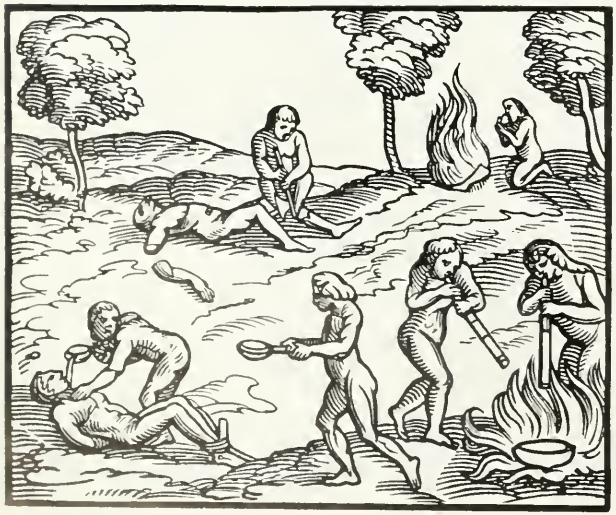
Haida grizzly bear, or huaji. *Silk screen print by Bill Reid, distinguished Haida Indian artist of Vancouver, B.C. The red and black print is a recent gift to Field Museum by Reid, who also works in wood, silver, gold, argillite (a rock intermediate between slate and shale), and other media. Reid recently visited the Museum as a consultant for the Northwest Coast and Eskimo exhibit, a permanent exhibit scheduled to open in Hall 10 in 1982.*

Courtesy The New York Public Library

Lake Guatavita, showing the results of Antonio de Sepúlveda's attempt to cut through the enclosing rock and thus drain the lake. Begun in the 1580s, the project employed some 8,000 Indian laborers but was eventually abondoned. From an 1810 engraving.

Indians pour molten gold down the throat of one Spanish captive while butchering another. From History of the New World, *by Girolamo Benzoni (1541-56).*



EL DORADO *continued from p. 7*

The Legend of El Dorado

The story of this extraordinary assemblage is that of the New World before the coming of the Conquistador, and of the explorations, discoveries, and cultural/technological transmutations that were brought about by the coming of the Europeans.

In 1539, more than three decades after coming to Colombia, the Spaniards began to hear stories of a certain "golden man," or *El Dorado,* and the extraordinary rituals which included his throwing vast quantities of gold offerings into Guatavita, a sacred lake located not many miles northeast of what is today Colombia's capital city of Bogota.

The most authoritative early account of El Dorado is that of the chronicler Juan Rodriguez Freyle (1636):

The first journey [the new Indian ruler] had to make was to . . . Guatavita, to make offerings and sacrifices to the demon which they worshipped as their god and lord . . . The lake was large and deep, so that a ship with high sides could sail on it, all loaded with

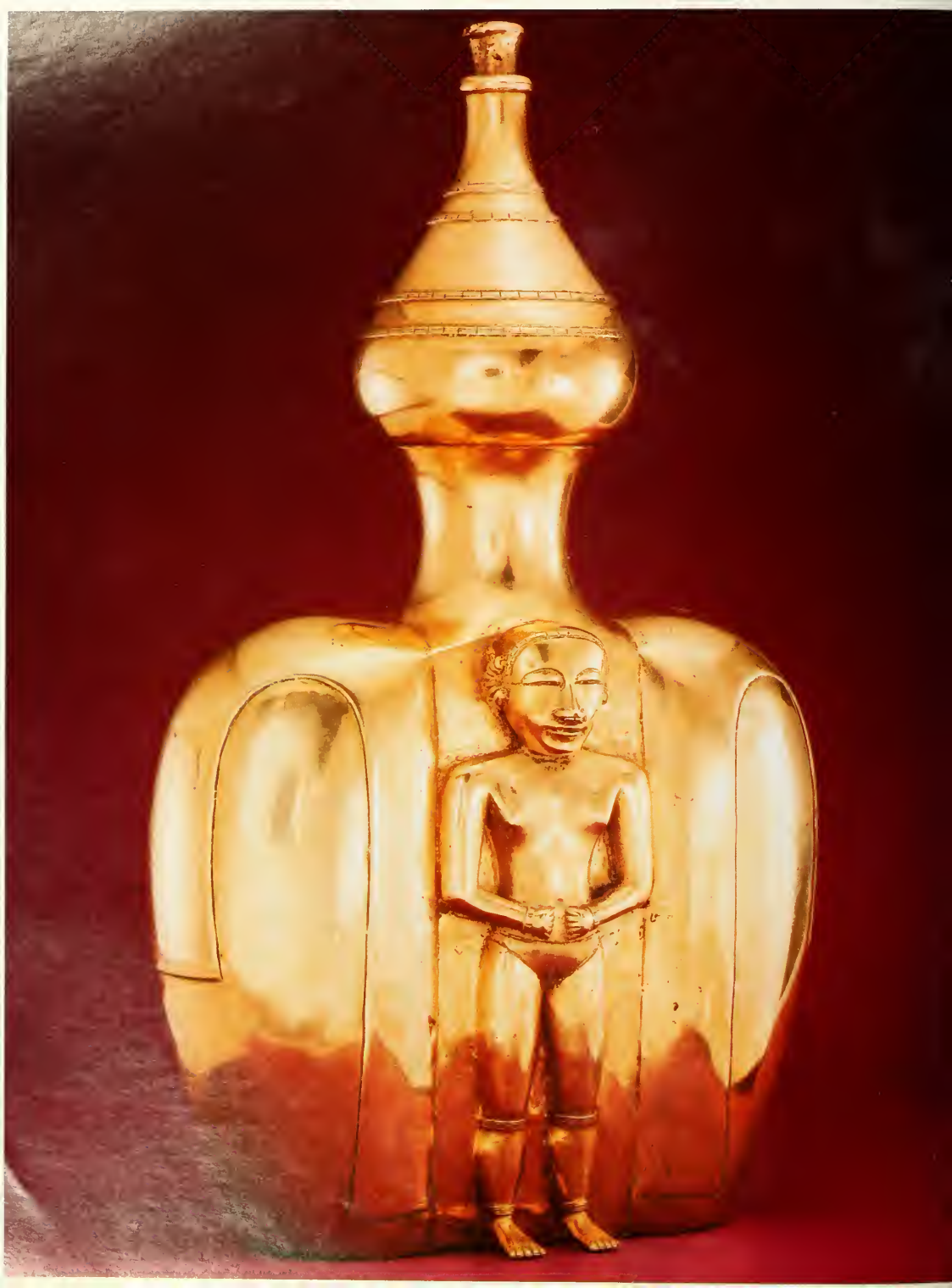
Text continued on page 24

Tolima pectoral. Made of cast gold. Height 17.7cm (7 in.). From Museo del Oro.

Courtesy The New York Public Library

Overleaf, p. 22: *Lime flask decorated with female figures in relief. Made of cast tumbaga (copper-gold alloy). Height 28cm (11 in.). Museo de América, Madrid. From the Treasure of the Quimbayas, discovered in 1891 and given to the queen of Spain by the government of Colombia.*

Page 23: *Darien pectoral, made of cast gold. Height 11.6cm (4-9/16 in.). From Museo del Oro. The Darien style is now believed to have been a composite of many regional styles. Similar pectorals have also been found in Panama, Costa Rica, and Yucatan.*



EL DORADO *continued from p. 18*

. . . men and women dressed in fine plumes, golden plaques, and crowns . . .

They stripped the heir to his skin, and annointed him with a sticky earth on which they placed gold dust so that he was completely covered with this metal. They placed him on the raft, on which he remained motionless, and at his feet they placed a great heap of gold and emeralds for him to offer to his god. On the raft with him went four . . . chiefs, decked in plumes, crowns, bracelets, pendants and ear rings all of gold . . . The gilded Indian then made his offering, throwing out all the pile of gold into the middle of the lake, and the [four] chiefs . . . did the same . . . After this, . . . the shouting began again, with pipes, flutes, and large teams of singers and dancers. With this ceremony the new ruler was received, and was recognized as lord and king. From this ceremony came the celebrated name of El Dorado, which has cost so many lives.

A few years before the publication of Freyle's account, officials reported from Bogota: *there is definite information that the lake bed contains great riches in gold, and, that although many different persons have several times tried to drain the said lake, none has succeeded. We, at our own expense and risk, with our own persons, industry, and effort, wish to drain it.*

Thus began a frustrating, disappointing series of efforts to harvest riches from the lake's bottom. "Having robbed the living Indians of most of their gold," wryly noted one historian, "it was time to attack the richest treasure of all."

About 1545 Hernán Peréz de Quesada employed a battalion of laborers to lower the lake's level by literally bailing it out. After three months of back-breaking effort the lake's level was down by three meters (about 10 feet) and Guatavita had grudgingly yielded a mere 3,000-4,000 pesos worth of gold. A generation later, Antonio de Sepúlveda attempted, with the help of 8,000 Indians, to dig through the lake's rocky rim. This brought about an additional drop of 20 meters in the lake level before the steep walls of the cut collapsed, killing many workers and bringing an end to the project. Sepúlveda's costly efforts resulted in the discovery of 12,000 pesos worth of treasure—a far cry from the millions alleged to lie beneath Guatavita's waters.

Little more was done about draining Guatavita until the 1820s, when work was resumed in deepening the cut begun more than two centuries earlier by Sepúlveda. But this, too, came to an end as landslides along the steep canal walls persisted. In 1899 interest was again revived in exposing the lake bottom. This time the scheme was to construct a tunnel under the lake and come up through its floor. The plan worked—for a time. The water quickly ran out, revealing a bottom of slime and mud, several feet thick. In a few days, under the equatorial sun, the mud baked to the consistency of brick. The dried mud also sealed up the sluices and the tunnel, and soon the lake again filled with water to its former level.

In 1911 a group of investors calling themselves Contractors Ltd. hoped to work a steam shovel to the lake's center. "There will be no doubt when it is reached," they assured prospective shareholders, "for gold dust and nuggets will certainly be found." But the firm's £15,000 capital was hardly enough to see the project through and the enterprise terminated in bankruptcy.

Following Contractors Ltd.'s demise in 1929, other expeditions tried their luck, using every mechanical means from drags to airlifts. With each, Guatavita continued to yield a tantalizingly few objects of gold, but the lake's center remained essentially untouched. The final chapter in this 400-year quest was the establishment by the Colombian government in 1965 of legal protection for Guatavita as part of the nation's cultural and historical heritage.

Will the full story of El Dorado and the Guatavita treasure ever be known or, like the treasure of Mexico's Sierra Madre, North America's Lost Dutchman Mine, and other troves, real and fanciful, around the world, will it merely persist as an ambiguous half-fact, half-legend to intrigue the imagination?

Though the tale of El Dorado and Guatavita will stir the pulse of anyone adventurous, the substantive story of Colombia's golden treasures and the one of principal interest to historians and archeologists, is that of existing artworks, the greatest number of which (26,000) are today part of the collection of Bogota's Museo del Oro. It is this collection—gathered from every part of Colombia's gold-working regions—that provides the bulk of the 500 pieces coming to Field Museum.

Though confined to a strip of the Cordillera about the size of the state of California, Colombia's gold-producing tribes were separate and distinct groups, to the degree that their languages were, in most cases, mutually unintelligible. Their customs, religious practices, and—as we may expect—art forms and styles were also highly individual.

Notable among these styles were the

Available at the Museum Shop is the strikingly beautiful Gold of El Dorado, *jointly published by the American Museum of Natural History and Harry N. Abrams. The 11½-by-16-inch volume carries 28 four-color illustrations of artifacts to be seen in the show. $9.95, with 10% discount for Members.*

Tairona of the far northern coastal region; Sinú, midway between present-day Panama and Venezuela; Quimbaya and Muisca, of the central Cordillera; Calima, Tolima, Popayán, Tierradentro, and San Agustín, somewhat further south; and Tumaco and Nariño, whose regions extend into Ecuador.

The visitor to "Gold of El Dorado: The Heritage of Colombia" will have the opportunity to study at close hand the intricate goldwork of the native Colombian tribes, to marvel at their sophisticated artistry, and the technologically advanced methods that were employed to produce them.

The presentation of the exhibit at Field Museum is under the direction of Michael Moseley, associate curator of Middle and South American archeology and ethnology, assisted by Robert Feldman, research archeologist. The exhibit designer is David Edquist. The U.S. tour is sponsored by Chemical Bank, with additional support from the National Endowment for the Humanities and the National Endowment for the Arts, and has been organized by the American Museum of Natural History. Further support for presentation of the exhibit at Field Museum has been provided by a grant from the Robert R. McCormick Charitable Trust. □

Jaguar of cast gold, in the Sinú style. From Museo del Oro. Length 12.1cm (4¾ in.).

Diadem. Made of cut and hammered gold; Early Calima style. Height 27cm (10⅝ in.). From Museo del Oro. The Early Calima style, coinciding with the time of Christ, is typified by large hammered ornaments.

April and May at Field Museum

(April 15 through May 15)

New Exhibits

"Gold of El Dorado: The Heritage of Colombia." The legend of El Dorado has intrigued mankind for centuries. Find out the real story by viewing more than 500 of the priceless treasures that inspired the legend. Some believe these glittering artifacts are among the most beautiful objects ever created in gold. Jewelry, musical instruments, hunting and fishing gear, and cooking utensils—all crafted from the valuable metal—acquaint us with a lost civilization. This extraordinary exhibit is the largest display of Colombian archeology ever to leave Latin America. Exhibit curator: Michael Moseley; designer: David Edquist. Opens April 25, Hall 27, 2nd floor.

"Patterns of Paradise." This major exhibit of dramatic and rare bark cloth, or *tapa*, illustrates the people and history of exotic tropical islands. See how Pacific peoples took the ancient task of making cloth out of tree bark and elaborated it into an art form of distinctive and remarkable styles. The Exhibit also includes wood carvings, masks, costume accessories, and tools. Most of the 200 artifacts are from Field Museum's world-famous Oceanic collections. Conceived and created by the Museum's own staff. Exhibit curator: John Terrell; designer: Donald Skinner. Through June 8, Hall 26, 2nd floor.

Continuing Exhibits

"Anniversary Exhibit." This exhibit shows visitors earth's diverse, yet universal life forms. "A Sense of Wonder" introduces the four natural history disciplines: anthropology, botany, geology, and zoology. The story of Field Museum's early years is told through "A Sense of History." Finally, "A Sense of Discovery" displays some unique features of the natural world. Hall 3, 1st floor.

"The Hall of Chinese Jades." Superb examples of jade art span 6,000 years of Chinese history. An exhibit in the center of the hall illustrates ancient jade carving techniques. Hall 30, 2nd floor.

"The Place for Wonder." Touch, handle, sort, and compare natural history specimens in this gallery. Carefully trained Museum volunteers help guide exploration. Open weekdays 1 to 3 p.m.; weekends 10 a.m. to noon and 1 to 3 p.m. Ground floor, near cafeteria.

New Programs

Members' Preview to "Gold of El Dorado: The Heritage of Colombia." Field Museum's breathtaking new exhibit is open exclusively for Members a day prior to public viewing. After touring the exhibit, join the Museum staff for refreshment and conversation. Free admission with Members' card or invitation. Thursday, April 24, 1 p.m.-9 p.m., Hall 27.

Ray A. Kroc Environmental Film Lecture: "Colombia: From Spanish Main to the Amazon." Filmmaker George Lange narrates this journey to Colombia, a land of beautiful mountains, tropical rain forests, remote Indian villages, and modern cities. A naturalist and lepidopterist, Mr. Lange is a guest lecturer on wildlife and primitive tribes at New York University. Tickets (Members, $2.00; nonmembers, $3.50) may be purchased at the West Door before the program. Friday, April 25, 8 p.m., Simpson Theatre.

"Members' Nights." How is a special exhibit put together? What topics are Museum scientists investigating? How does the staff handle fragile specimens? You'll find the answers to these ques-

(Continued on back cover)

Members' Nights

Mark your calendar now for Members' Night, Field Museum's annual open house for its Members, to be held this year on Thursday and Friday, May 1 and 2.

As in the past, free round-trip charter bus service will be provided between the Loop and the Museum. For the first time this year, these CTA buses, marked FIELD MUSEUM, *will originate at Union Station with stops at Northwestern Station, Washington and State, Washington and Michigan, Adams and Michigan, and Balbo and Michigan. Two buses will be making continuous circuits, beginning at 5:45 and passing at about 15-minute intervals, until the Museum closes.*

Plenty of free parking is available in Soldier Field lots and the Plantarium parking area, with a shuttle bus continuously circling the areas and collecting and discharging passengers at the Museum's south steps.

From 6 p.m. to 8 p.m. the Museum's food service area will provide complete dinners or snacks.

So plan your Members' Night visit now, reacquaint yourself with your Museum. Entertainment and educational programs will be offered each evening from 6 until 10 p.m.

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April and May at Field Museum

(Continued from inside back cover)

tions, and many more, at the Museum's celebrated behind-the-scenes open house. The staff has planned a wide range of activities exclusively for Members — special displays, lectures, games, tours, and demonstrations. Research areas are open 7:00-10:00 p.m. Thursday, May 1, and Friday, May 2.

"Tahuantinsuyo: Music and Dance of the Andes." Come hear this group of performers play ancient music of the Andes. Costumed folkdancers and slides of the mountains enhance this program of music and folklore. Planned in conjunction with "Gold of El Dorado: The Heritage of Colombia," and funded in part by NEH, a federal agency. Tickets (Members, $2.00; nonmembers $3.50) are available at the West Door before the performance. Saturday, May 3, 2:30 p.m., Simpson Theatre.

Ray A. Kroc Environmental Field Trips. These one-day trips to local areas of ecological and biological interest resume in May. For a field trip brochure, call 922-3136.

Spring Adult Education Classes. These noncredit, college-level courses in anthropology and the natural sciences begin April 15. Advance registration by mail is requested. For more information, call 922-0733.

Continuing Programs

Edward E. Ayer Film Lectures. "Visit" a distant corner of the world by attending these free 90-minute programs, narrated by the filmmakers themselves. Held every Saturday in April at 2:30 p.m. in the Simpson Theatre (enter through West Door), these programs are recommended for adults. "The Hawaiian Adventure," with Doug Jones, April 19. "The Majestic Rhine," with John Roberts, April 26.

Weekend Discovery Programs. Each Saturday and Sunday between 11 a.m. and 2 p.m., the Museum offers a variety of free, exhibit-related tours, demonstrations, and films on current natural history topics. Check the "Weekend Sheet" available at Museum entrances for program times and locations.

Friend or Foe? The Natural History Game. The object here is to determine which one of a pair of apparently similar specimens is harmful and which is not. See if you can distinguish a vampire bat, a headhunter's axe, a poisonous mineral, or a deadly mushroom from its benign look-alike. Ground floor, no closing date.

On Your Own at Field Museum. Self-guided tour booklets, adult- and family-oriented, are available for 25¢ each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with scientific interests and backgrounds are needed to work in the various departments. For more information call Volunteer Coordinator, 922-9410, ext. 360.

April and May hours. In April, the Museum is open daily 9 a.m. to 5 p.m., except Fridays. During May, the Museum is open every day 9 a.m. to 6 p.m., except Fridays. On Fridays, throughout the year, the Museum is open 9 a.m. to 9 p.m.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor.

Museum telephone: (312) 922-9410

Indians panning for gold. From Historia General y Natural de las Indias, *by Gonzalo Fernandez de Oviedo (1535-48). For more on exhibit "Gold of El Dorado: The Heritage of Colombia" see page 7.*

Courtesy The American Museum of Natural History

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

1980

MEMBERS' NIGHTS
May 1, 2

Field Museum
of Natural History
Bulletin

May 1980
Vol. 51, No. 5

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Field Museum of Natural History

Founded 1893

President and Director: E. Leland Webber

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COVER

May flowers in Morton Arboretum, Lisle Illinois, about 35 miles southwest of downtown Chicago. Pink-streaked white flowers are spring beauty (Claytonia virginica)*; also shown are the blue violet* (Viola papilionacea) *and yellow violet* (V. pensylvanica). *Photo by John Kolar.*

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FIELD BRIEFS

Ambassador Chai Zemin at Field Museum: *At left, Ed Bedno, chairman of the Department of Exhibition, shows the ambassador a scale model of the coming exhibit of Chinese bronzes, opening August 20. Shown with them is William G. Swartchild, Jr., chairman of the Field Museum Board of Trustees. Above, Zemin poses with three other visitors whom he met in the "hands-on" gallery, the Place for Wonder.*

Chinese Ambassador Visits

Chai Zemin, ambassador of the People's Republic of China to the United States, visited Field museum on March 11. Highlights of his tour of the Museum included "Ancient Chinese Culture" (Hall 24), "China in the Ch'ing Dynasty" (Hall 32), and a look at a scale model prepared by the Department of Exhibition for the exhibit "The Great Bronze Age of China: An Exhibition from the People's Republic of China," opening August 20.

Ambassador Zemin has represented his country since January, 1979. This was his first visit to Chicago.

Museum Hosts Third Annual Spring Systematics Symposium

Saturday, May 10, is the meeting day at Field Museum for the third annual Spring Systematics Symposium. The theme this year will be "Biotic Crises in Ecological and Evolutionary Time." Symposium chairman is Matthew N. Nitecki, curator of fossil invertebrates. Among the eight symposium speakers this year are two Field Museum curators: Larry G. Marshall, assistant curator of fossil mammals, who will speak on "Biological Crises of Invasion," and Michael E. Moseley, associate curator of Middle and South American archeology and ethnology, who will speak on "Living with Crises; Human Perception of Processes and Time."

Other speakers include David N. Schramm, of the University of Chicago: "Astrophysical Framework for life," Hugh M. Raup, of Harvard University: "Physical Disturbance in the Life of Plants," Daniel S. Simberloff, of Florida State University: "Community Effects of Introduced Species," Stanley M. Awramik, of the University of California, Santa Barbara: "The Pre-Phanerozoic Ecosphere—Three Billion Years of Crises and Opportunities," Alfred G. Fischer, of Princeton University: "Biotic Crises, Climates, and Earth History," Lawrence B. Slobodkin, of the State University of New York at Stony Brook: "The Determinance and Effects of Ecological and Evolutionary Response Rates—a Summary and Prospectus."

Recent Grants

Grants from three federal agencies—the National Science Foundation (NSF), the National Endowment for the Humanities (NEH), and the National Aeronautics and Space Administration (NASA)—have recently been received in support of projects at Field Museum.

The NSF grants include the following: (1) $43,267 in support of the project "Care and Use of the Systematic Collection of Mammals," under the direction of Patricia W. Freeman, assistant curator and head, Division of Mammals. (2) $43,016 in support of the project "Geochronology of Mammal-Bearing Cenozoic of Argentina," to establish a radioisotope time scale for certain fossil beds in Argentina. Principal investigator for the project is Larry G. Marshall, assistant curator of fossil mammals. (3) A $12,110 grant in support of the NSF Summer Anthropology Course for high-ability high school students, "Student Science Training," under the direction of Harriet M. Smith, instructor, Department of Education. (4) A $6,874 award for equipment to improve the Botany Laboratory. Project director: William C. Burger, curator and chairman, Department of Botany.

The NASA grant of $18,965 is in support of research entitled "Refractory Inclusions in the Murchison Meteorite." Principal investigator is Edward J. Olsen, curator of mineralogy. The NEH grant, in the amount of $332,079, is in support of the project "Marine Hunters and Fishers," a major renovation and reinstallation of Hall 10. Edward Bedno, chairman of the Department of Exhibition, is project director.

FIELD MUSEUM TOURS

1980 Tour Packages Exclusively for Members

Stonehenge, to be visited by Field Museum's tour of England and Wales.

The Classical Lands:
Greece and the Grecian Isles
September 7-26

Under the leadership of Dr. Donald Whitcomb, Field Museum assistant curator of Near Eastern archeology and ethnology, this tour will visit Athens, the sites of ancient Corinth and Mycenae, Delphi, Olympia, Knossos, Santorini, the island of Rhodes, Miletus, Skiros, Piraeus, and numerous other sites of interest in the history of western civilization and art.

Following six days and five nights in Athens, the sleek luxury motor yacht *Cavo D'Oro*, with 30 passenger cabins, will take tour members across the shimmering waters of the Aegean to some of the loveliest and most historically interesting of the Greek Isles.

Cost of the tour—$3,425 (plus a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare via American Airlines between Chicago and Greece. First class accommodations will be used throughout. The package includes almost all meals (all meals while aboard the *Cavo D'Oro*), motorcoach fares, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $300 per person.

Participants in Field Museum's September tour of Greece and the Grecian Isles will spend part of their time cruising the Aegean aboard the luxury cruise ship Cavo D'Oro.

Tour of England and Wales
June 14-July 3

Highlights of this unique tour—which includes sites of geologic, historic, and aesthetic interest—are Stonehenge, the 4,000-year-old marvel of prehistoric engineering; the Roman ruins at Bath; Weston-super-Mare, a popular seaside resort on the Bristol Channel; the incomparably lovely Lake District; Winchester Cathedral; and many other beautiful old castles, cathedrals, and manor houses of Wales and England. Three nights will be spent in London, to enjoy the cultural amenities of the city. Leader of this tour (which is limited to 25) will be Dr. Bertram Woodland, curator of petrology, and a native of Wales.

Cost of the tour—$2,340 (plus a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare between Chicago and London. First class accommodations will be used throughout. The package includes breakfast and dinner daily, chartered motorcoach, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $250 per person.

Devil's Lake

Wisconsin's Baraboo Range
June 21-22

Dr. Edward Olsen, curator of mineralogy, will lead tour members through the Baraboo Range and along the shores and hinterland of beautiful Devil's Lake. The Baraboo Range is of special interest as a *monadnock*—what is left of an ancient mountain range and which now stands out above the younger rocks and sediments. The range consists of quartzite—more than one billion years old—which, although compressed in places into vertical folds, retains the original sedimentary structures. The mountains were further modified by glaciers, forming the lake and the picturesque glens, and changing the course of rivers.

Overnight accommodations and meals will be at the Dell View Motel, located in a lovely pine grove on Lake Delton, at Wisconsin Dells. Hiking clothes are strongly recommended for the scheduled hikes. The trip is not suitable for children, but younger people interested in natural history are welcome. The cost of the Baraboo trip is $95 per person (double occupancy).

Members' Nights

Field Museum's Open House for Members

May 1, 2

Ever wanted to see how a museum exhibit is put together, to chat with a curator about Museum research, to write your name in Egyptian hieroglyphics, or just to explore the Museum's laboratories, poke your nose into the preparation rooms and collection areas? Your chance for that experience is on May 1 and 2, from 6:00 to 10:00 p.m.—Field Museum's annual open house for all its members. There will also be demonstrations, games, lectures, slide shows, and other activities to satisfy the interests and tastes of every age group—from kindergarten on up.

In addition, this year we will be fortunate to have two major temporary exhibits on view during Members' Nights: "Patterns of Paradise," in Hall 26 and "Gold of El Dorado," in Hall 27. Special entertainment will be provided by the South American group "Tahuantinsuyo," which will perform traditional music and dance of the Andes.

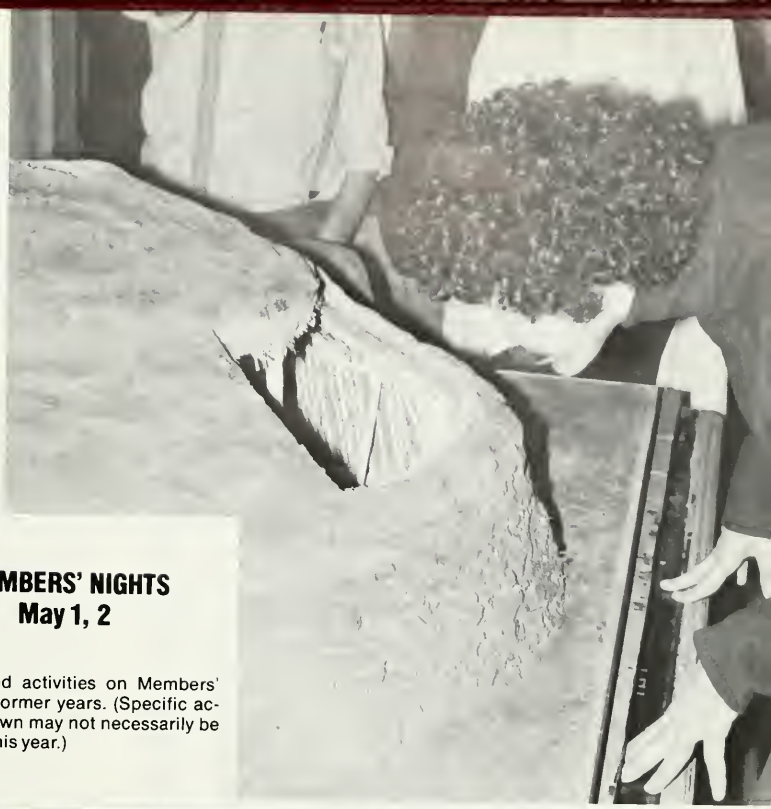
As in the past, free, round-trip charter bus service will be provided between the loop and the Museum. These CTA buses, marked *FIELD MUSEUM*, will originate at Union Station, and stop at Northwestern Station, Washington and State, Washington and Michigan, Adams and Michigan, and Balbo and Michigan. Two buses will run circuits, beginning at 5:45 and continuing at 15-minute intervals until the Museum closes.

To achieve an equitable distribution of visitors, it is suggested that those whose last name begins with a letter between A and L come on Thursday, May 1, and those between M and Z come on Friday, May 2.

Plenty of free parking is available in Soldier Field lots and the Planetarium parking area, with a shuttle bus continuously circling the areas and collecting and discharging passengers at the Museum's south steps.

From 6 p.m. to 8 p.m. the Museum's food service area will provide complete dinners or snacks.

All Field Museum Members and their families are urged to come, and to reacquaint themselves with *their* Museum.



MEMBERS' NIGHTS
May 1, 2

Scenes and activities on Members' Nights of former years. (Specific activities shown may not necessarily be repeated this year.)

Lake Michigan Ravines On Chicago's North Shore

By ROBBIN C. MORAN

JUST NORTH OF CHICAGO, between Waukegan and Evanston, is a series of ravines running into Lake Michigan. These ravines had their origins about 12,000 years ago while the last continental glacier was melting northward. The retreat of the glacier left tons of rock, gravel, sand, and especially clay in a series of consecutive ridges, moraines, paralleling the present Lake Michigan shoreline.

In the moraine adjacent to Lake Michigan, in some places 75 feet high, the scenic lake bluffs and ravines have formed. This moraine extends from Waukegan to Glencoe, some 20 miles south. North of Waukegan and south of Glencoe is the low, flat sandy plain of Glacial Lake Chicago, where no moraine was present and the ravines were thus unable to form.

During the past 12,000 years the ravines have been eroding themselves deeper and deeper into this morainic ridge, until some extend as much as a mile inland. Erosion has not been accomplished by a gradual downslope movement of soil throughout the year; rather, the erosion occurs primarily in the spring, when large chunks of earth fall all at once into the ravine bottom. Since spring in this area is customarily a very wet time of year, there is abundant moisture between the clay particles in the moraine, which facilitates slippage and the resultant movement of huge amounts of earth. The large chunks that break loose are then slowly eroded into the streams of the ravine bottoms, and the sediments are washed away into Lake michigan.

The same kind of erosion occurs on the

*Aerial view of typical north shore ravine as it meets Lake Michigan shoreline. White-trunked paper birch (*Betula papyrifera*), seen here on left slope, is typically found further north. Photo courtesy Illinois State Geological Survey.*

clay bluffs adjacent to the lake; huge amounts of earth slide downhill, often causing problems for lakeshore property owners. Geologists have known since the late 1800s that lake bluff erosion occurs in regular cycles. More recently, scientists from the Illinois Geological Survey gathered old records together and determined erosion rates for various locations along the Lake Michigan shoreline. Survey results showed that at the village of Lake Bluff an average of 259 feet of clay bluff has eroded away since 1872[1]. Lakefront property owners, unfortunately, have no way to completely stop the erosion; it can only be slowed down by various means.

For many, a main attraction of the ravines is their growth of dense green forest. The ravines are particularly interesting to local botanists because of the presence of plants that are generally more apt to be found further north, such as paper birch (*Betula papyrifera*), white pine (*Pinus strobus*), arborvitae or white cedar (*Thuja occidentalis*), Canadian buffalo-berry (*Shephardia canadensis*), star-flower (*Trientalis borealis*), and small horsetail (*Equisetum scirpoides*). Botanists consider these more northern plants as "relicts," in the sense that they were probably more widespread and abundant in the Chicago Area when the climate was cooler and the vegetation had a more northern aspect in early post-glacial times. Since the northward retreat of the glaciers, the climate has warmed and consequently the ranges of these plants in the Chicago Area have become restricted to the deep, shaded ravines and cooler habitats near Lake Michigan.

Also of interest to local botanists are the only known colonies of beech (*Fagus grandifolia*) in northern Illinois. Apparently beech does not survive on the drier oak woodlands and prairie uplands of the Chicago area. Rather, it prefers the cool, moist north-facing ravine slopes.

The ravines also furnish habitats for 16 native plant species that are considered to be threatened or endangered in Illinois, including the American dog-violet (*Viola conspersa*), a species of bluegrass (*Poa languida*), downy Solomon's seal (*Polygonatum pubescens*), a black-seeded rice grass (*Oryzopsis racemosa*), and pale vetchling (*Lathyrus ochroleucus*). The heart-leaved plantain (*Plantago cordata*) is another endangered plant known to occur in the ravines. It was collected in 1880 at a ravine in Highland Park by the early Chicago botanist Rev. E.J. Hill, and has not been found since. The heart-leaved plantain grew in the shallow ravine bottom streams and required a constant supply of cold, unpolluted groundwater throughout the growing season. Presumably this plant has vanished from the ravines as the result of various man-caused disturbances to the ravine bottom streams, such as sewage and rain water runoff pipes, ditching, and so forth.

Downy yellow violet (Viola pubescens) *and the wooley blue violet* (V. sororia), *shown on p. 11, are the two commonest violets in the ravines. Photo by Robbin C. Moran.*

Several different plant communities, or habitats, occur within the ravine ecosystem. Topography largely determines their presence or absence in any particular locality. On the ravine slopes occur a rich and diverse plant community dominated by sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and red oak (*Quercus rubra*). Forest cover on the flat uplands surround-

1. Berg, R.C. and C. Collinson. 1976. Bluff Erosion, Recession Rates, and Volumetric Losses on the Lake Michigan Shoreline in Illinois." *Illinois Geological Survey Environmental Notes*, 76.

Robbin Moran is a graduate student in botany at Southern Illinois University at Carbondale. His study of the area under consideration here was largely funded by the Lake Forest Garden Club.

ing the ravines consists primarily of shagbark hickory (*Carya ovata*) and several species of oaks such as bur oak (*Quercus macrocarpa*), Hill's oak (*Q. ellipsoidalis*), red oak (*Q. rubra*), white oak (*Q. alba*), and swamp white oak (*Q. bicolor*). The clay bluffs facing Lake Michigan provide a different set of plant communities.

Those who live near the ravines are familiar with the beautiful spring wildflowers displayed there. The first spring blooming plants in mid-April are bloodroot (*Sanguinaria canadensis*) and hepatica (*Hepatica acutiloba*), followed by the great white trillium (*Trillium grandiflorum*), which often whitens entire ravine slopes. By mid-May other prominent blooming wildflowers are trout lily (*Erythronium albidum*), bellwort (*Uvularia perfoliata*), Jack-in-the pulpit (*Arisaema triphyllum*), wooley blue violet (*Viola sororia*), downy yellow violet (*V. pubescens*), wood anemone (*Anemone quinquefolia*), blue phlox (*Phlox divaricata*), pussey's-toes (*Antennaria plantaginifolia*), baneberry or doll's-eyes (*Actaea alba*), and many others. About 75 percent of the ravine wildflowers come into bloom and complete their life cycle before mid-June. This adaptation of early spring flowering allows the plants to manufacture food while sunlight is available on the forest floor before the overhead trees have produced a dense shade. Plants with this life strategy are called *ephemerals*. It is interesting to note that ravine wildflower populations come into flower approximately two weeks later than wildflower populations a few miles inland. This is because temperatures nearer the lake are cooler in springtime.

Because of overpicking by zealous wildflower lovers, the yellow lady's slipper orchid (Cypridedium calceolus) *is now extremely rare in the ravines. Photo by Robbin C. Moran.*

Since spring ephemerals manufacture food by photosynthesis for only a short time during spring, picking or gathering them greatly reduces their chance for survival, for not enough time remains for them to manufacture the food that is to be stored in roots, corms, or bulbs for the following year's growth. Several plants have been greatly reduced in the ravines by zealous over- picking. The showy lady's-slipper orchid (*Cypripedium reginae*) has apparently been extirpated from the ravines for this reason.

At the base of some ravine slopes occurs a special type of plant community known as a *seep* —where calcareous groundwater percolates, or "seeps," out of the ground. The soils in these areas are saturated with water year-round and are a nuisance to hikers who may sink well above their ankles in mud. Special environmental conditions created by the abundance of calcareous groundwater allows many interesting plants to occur. Skunk cabbage (*Symplocarpus feotidus*), the ecological dominant of many seeps, can be used as an "indicator plant" because it typically outlines the boundaries of the seep habitat. This hardy plant sends up its unusual flowers during the last cold days of March, when other spring wildflowers are still dormant. The skunk cabbage flower is surrounded by a thick fleshy hood known to botanists as a *spathe*. This reddish-purple structure enables the plant to absorb the sun's rays and keep the developing flower within at a warmer temperature than the outside air.

The witch-hazel (*Hamamelis virginiana*) is the most abundant shrub in the ravines and on the uplands. It is unique among ravine trees and shrubs in that it produces its small yellow flowers in late September and early October. All other ravine trees and shrubs flower in the spring. A good field identification character of witch hazel is its horizontal layered pattern of spreading branches. The shrub's layered branching pattern is a survival strategy which allows the leaves to intercept the small amount of sunlight that manages to filter down through the tall trees in midsummer. Other shrubs frequently found in the ravines are maple- leaved viburnum (*Viburnum acerifolium*), downy arrowwood (*V. rafinesquia-*

*Wooley blue violet (*Viola sororia*) and the downy yellow violet (*V. pubescens*), shown on p. 9, are the two commonest violets in the ravines. (Photo by Robbin C. Moran.)*

num), black haw (*V. prunifolium*), prickly gooseberry (*Ribes cynosbati*), and shadbush or serviceberry (*Amelanchier laevis*).

The original vegetation of the lake bluffs was primarily forest; lake erosion, however, has now greatly reduced the extent of this forest. An open shrub community with numerous prairie forbs occurred interspersed among the forests on the lake bluffs. Common shrubs in these open lake bluff habitats included Canadian buffaloberry (*Shephardia canadensis*), red osier dogwood (*Cornus stolonifera*), common juniper (*Juniperus communis*), red cedar (*J. virginiana*), and New Jersey tea (*Ceanothus americanus*). Some of the prairie forbs that occurred on the clay bluffs were seneca snakeroot (*Polygala senega*), smooth aster (*Aster laevis*), golden Alexanders (*Zizia aurea*), toadflax (*Comandra richardsiana*), and stiff gentian (*Gentiana quinquefolia*). Today, because of severe erosion by Lake Michigan, many of the lake bluffs are bare morainic clay with only a few foreign weeds growing on their steep slopes. Nevertheless, as lake levels recede, the steep clay bluffs will erode to more gentle slopes, enabling plants to get a foothold and begin the process of succession to a mature forest.

Constantly changing the ravine ecosystem are various disturbances caused by man: power lines, rainwater runnoff pipes, and housing subdivisions; fragile ravine slopes are trampled and exotic plants are introduced. In the course of my botanical study of the ravines I was unable to find 17 plants that had been recorded there by earlier botanists.[2] Presumably, many of these plants have been eliminated by various forms of human disturbance (the heart-leaved plantain for example). I did find in the ravines 36 plants that are introduced aliens to the United States. One of these alien plants, goutweed (*Aegopodium podagraria*), poses a threat to native plants that live in the ravine bottoms, for it often forms dense colonies, excluding all the indigenous species. Other exotic introduced plants are also establishing themselves in the ravines and taking the place of native ravine species. Several years from now, certainly, the ravine flora will be different in many respects from that which prevails today. Despite these disturbances, the ravines with their many interesting plants and spectacular scenery will continue to be a unique feature of the Chicago area's natural landscape.

2. Moran, R.C. 1978. "Vascular Flora of the Ravines along Lake Michigan in Lake County, Illinois." *The Michigan Botanist*. 17(4):123-140.

Six Decades of Change In the Palos Woodlands

By PHIL HANSON

VINTAGE PHOTOGRAPHS, typically, have not only a nostalgic charm, they can also be of unique value to the historian or—in the case of the photos reproduced here—to the natural historian and ecologist.

Such photos of outdoor scenes may reveal features in the landscape that have been altered, dramatically or subtly, during the intervening years, or they may reveal conditions that have vanished entirely or, on the other hand, which have remained essentially unchanged for perhaps a millennium.

What can often cast an old photograph into special perspective is comparison of it with a contemporary one. By comparing two photographs taken from the same vantage point many years apart, they become more than just a record of a place at two different times. It is possible, by comparing the photographs, to recognize not only what kinds of change have taken place, but to determine how fast these changes have occurred, and to what extent.

The changes are frequently obvious: a housing development now covers what was once a farm, an expressway transects an old neighborhood. In other cases the changes may be more subtle. Areas that have escaped development change at a more leisurely pace: A forest edge may have crept a few more yards into an abandoned pasture, or the spring torrents of many years may have established a new course, with the former route outlined by abandoned oxbows. Such changes usually occur so slowly and so subtly that they escape our attention until we are confronted by the dramatic evidence of photos taken at great intervals of time.

The vintage photographs shown here, taken from the Field Museum archives, date mostly from 1916 or before. All are of what is now known as the Palos area, in southwestern Cook County, some 20 miles from downtown Chicago. The highly scenic Palos area, with its pleasing vales and hills, differs markedly from the table-

Palos Woodland stream. Old view above, present view at right. Bridge in old view has disappeared.

Palos Park Hill. Left: As it appeared on October 21, 1914. Below: as it appears some 66 years later.

top flatness of most of the city of Chicago. In Palos, the Des Plaines River Valley and the Sag Valley have cut a hundred feet into the flat surface, and streams draining from the highlands to the valley floors have created a whole range of rugged mini-landscapes. It was, and is today, an ideal setting for the landscape photographer.

Because much of the land in these pictures was acquired by the Cook County Forest Preserve District many years ago, the Palos area remains open land today. The forest shown in the old photos still exists today; but we can see, by comparing the old with the contemporary, how much change has actually occurred during the six and a half decades or more.

The absence of identifying landmarks in landscape photographs can make it difficult or impossible to pinpoint the precise locations of the photos. Many old photographs, then, must be appreciated solely for their aesthetic or nostalgic appeal. The location of some of these photos was facilitated by notes on the original jackets of negatives and from information provided by members of the Palos Historical Society.

Phil Hanson is head, Group Programs Division, Department of Education.

Road through Palos Woodlands. Above: about 65 years ago, tracks of interurban railway were in regular use. Left: the route is transformed, with disappearance of railroad tracks and construction of hardtop roadway.

Volunteers Recognition Party

Feb. 20, 1980

Photos by Division of Photography

Clockwise, from top left: *William G. Swartchild, Jr., chairman of the Field Museum Board of Trustees, congratulates Carol Kopeck, volunteer in Public Relations (555 hours in 1979); Sue Carole DeVale, visiting assistant curator of ethnomusicology and a professional harpist, performs on the harp; Swartchild–with Field Museum President E. Leland Webber in background–congratulates Sol Gurewitz, volunteer in anthropology and photography (523 hours); Swarthchild congratulates Roger Larson, volunteer in Accounting (500+ hours); Miss Piggy (Anthony Pfeiffer of Education) provides some light entertainment; Ron Holdman, of Purchasing relaxes between renditions on the drums; Field Museum Chorus, with Kathy Laughlin (Accounting) Gordon Baird (Geology), Sarah Derr (Mammals), Mari Mullen and Alice Lewis (Education) Roberta Becker (Botany), Sue Ann Harrison and Darlene Pederson (Education); Invertebrates Curator Alan Solem congratulates Elizabeth-Louise Girardi, volunteer in Invertebrates (300+ hours).*

OUR ENVIRONMENT

Recycling Money (Al)

Until recently Al (Real Name Withheld) was a typical young man. After he was fired from his job as a truck driver, he began to work for Money Recycling, Inc. Recycling money? Sounds like a good method for Communists. Al admits there were some recycling programs, although the programs were unsuccessful. Some were in trash. While some states have legislated requiring the recycling of cans, others installed their programs on a voluntary basis. Some states have even set laws on containers as "recycling-proof" (glass from Hawaii, which will not be refund, recycling it).

But the important point is that used money can now be recycled. Frederick Herrick, the Administrator of Permanent Retirement stated, "Understanding and never worked out of that same dollar." Each dollar recycling worker is taught to look at the greenback and wonder, "Am I alive, become a millionaire overnight? With rising prices and current shortages of oil, it makes sense to recycle all the [illegible] we can."

Just how much of a real threat, environmentally, is recycling? According to the Treasury Department Statistics (1972), about 198 million gallons a day are generated each year by the oil corporations who change their used money oil. While some of this oil is recycled - either through re-refining, or through use as a fuel in furnaces - most of it is dumped in sewers, on farmlands, in trash cans, or even in the neighbor's backyard. Each year, as more and more people decide to change their used money oil, this amount of waste presumably increases and will increase.

Re-refined oil can be just as good as new oil, and most oil companies are for [illegible], which a government-introduced oil recycling program recovered 70 percent of the waste oil[illegible] each year. Most of the [illegible] re-refined oil [illegible].

In Minnesota, a large portion of the [illegible] oil is used in [illegible] to keep machinery. Although [illegible] oil is considered [illegible] for use in automobiles in Minnesota, this is a growing trend in many other states.

The Minnesota Pollution Control Agency [illegible] has instituted an extensive [illegible] to encourage the public to recycle used oil. Recently, the agency used [illegible] and newspaper articles to publicize the program, which resulted in over 2M gallons [illegible] from citizens with automobiles [illegible] oil collection sites. The rules: Many people said that they were glad to have found the program so they [illegible] saving gas, oil [illegible] know where to [illegible].

Besides Minnesota, two other states [illegible] of Alaska's Division [illegible] have [illegible] programs. A month [illegible] plans to begin such a program this month. The [illegible] of Montana [illegible] have [illegible] programs, although [illegible] [illegible].

"Fingerprinting" - As Pollutants

When "fingerprinting" of people has been the [illegible] "fingerprinting" of air pollutants is to do the same by pinpointing the [illegible] sources of air pollutants.

A new technique, known as "fingerprinting", [illegible] and Commissioner Lewis, identifies the individual air pollution contributors in [illegible] cities. The principle [illegible] are relatively [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

"The human [illegible] as [illegible] to the [illegible]," said Edward Jensen, [illegible] of Missouri Commissioners and Laboratories [illegible]. "But [illegible] science [illegible] was [illegible] where all [illegible] is coming from."

Jensen [illegible] was in Montgomery, Pa. [illegible] ago and personally [illegible] the idea of "fingerprinting" [illegible]. But he [illegible] he needed help. [illegible] he [illegible] [illegible] in the U. S. Navy, [illegible] [illegible]. He teamed up with Richard Lewis [illegible] to develop the technique that evolved [illegible].

Lewis, who has a Ph.D. in [illegible], went to the Allegheny County Bureau of Air Control about a year ago and applied the new technique for the first time. In that study he found to his surprise that air pollution in Allegheny County came mostly from [illegible] rather than [illegible] sources.

The new "fingerprinting" technique consists of identifying thousands of air particles, one by one. Then [illegible] chemists and other [illegible] [illegible] [illegible] [illegible] [illegible]

At 10:45 a.m. on Tuesday, November 27, Kenneth Doudt of Reedsport was attacked and bitten while surfing. The attack came as Doudt lay on his surfboard facing seaward, about 100 yards from the beach in 12 to 15 feet of water. The shark seized the board and Doudt in its jaws.

After a bit of shaking, in which Doudt suffered massive wounds to chest, abdomen, and left side, the shark sank into the water and Doudt came free. He swam to his board and came to the beach on the next wave where friends helped him till emergency crews arrived.

After surgery, Doudt made a remarkable recovery and was released from a Portland hospital several weeks later. It was reported he will suffer little permanent impairment from the ordeal.

Following the attack, biologists took measurements of the bite on the surfboard which measured 12¾ inches across and 8¾ inches in from the board's edge. Shark experts confirmed that the attack was made by a great white shark (the species of *Jaws* fame) and estimates of its size range from 12½ to 16 feet.

The attack was believed to be one of territorial defense rather than feeding. White sharks apparently establish temporary territories covering a several-mile area where they may stay for several days to a week and sometimes longer before moving on. They will drive all other large animals from one of these temporary homesites.

Although not abundant, white sharks have been reported as far north as Alaska. Some may be in the Oregon coastal area off and on all the time but during the summer many travel northward in the warmer tuna waters offshore. The warm currents usually break up in the fall, and upwelling of deeper, colder water inshore breaks down, leaving warmer water along the beach from September to December. This, combined with fall salmon runs entering coastal rivers and the seal population in the area, may lure white sharks to the coastal zone.

Only one other confirmed shark attack is recorded off Oregon's shores. It occurred several years ago off the mouth of the Umpqua River. In that attack a large shark bit away the rear part of a surfboard, but its rider was unharmed—*Oregon Wildlife*.

Aspen as Cattle Feed

The package of meat in the supermarket looks like any other, except for the label: U.S. prime aspen-fed beef.

"Harrumph," the suspicious shopper says. "Probably need a saw to cut it."

Wrong. In fact, the beef cooks up juicier, more tender and flavorful than traditional corn-fed meat.

You won't find the wood-fed beef in the markets just yet. But it may not be long. Following extensive tests, the U.S. Food and Drug Administration has recently approved the use of aspen as an animal feed.

In Bigfork, Minnesota, farmer Chet Cook shovels pellets of aspen into feed troughs. His beef cattle see it's dinner time, mosey across the frozen barnyard, and begin gobbling up the wood.

"They can't get enough of it," Cook says with a satisfied grin.

The aspen has been pulverized into a sawdustlike consistency, dried and densified into chewable pellets. The aspen alone has only a small protein content—about 2 percent—not enough to maintain an animal. However, it can be combined with alfalfa or other grasses to produce a higher protein feed.

Steaks from beef cattle fed the aspen-alfalfa blend in University of South Dakota tests several years ago were sampled by a panel, said the university's Les Kamstra, one of the leading researchers in the field.

"Surprisingly enough, it had a higher rating than normal (corn-fed beef)," he said. "It was juicier, more tender and tasty than corn-fed. The test panel liked the wood steaks best."

Livestocks like the wood so well that their daily intake had to be restricted during tests. This should come as no surprise, say Kamstra and others who have worked with the aspen.

"We should have known this because wild animals have eaten aspen since the beginning of time," said Cook, who is also a small-scale logger. He noted that deer and grouse both thrive on aspen bark and buds.

Ted Niskanen of the Minnesota Department of Economic Security said farmers in Europe cut brush and trees for use as feed during droughts or other hard times when conventional feeds were unavailable.

But why would a farmer want to feed his cattle aspen instead of hay or other conventional feeds?

Cost, the men say. Kamstra believes aspen pellets can be produced cheaper than hay from material that, until now, was wasted. Sawdust from sawmills and tree tops and branches left behind during logging operations—which are 30 percent of the tree—have simply not been utilized, Cook said.

Niskanen and others admit the immediate future of wood pellets may be as a fuel rather than a feed. The same pellet that cows munch burns like coal in furnaces. But if costs of other feeds increase, or their availability decreases, say, from a drought, aspen could be become a lucrative alternative, Niskanen says.

This is one of the reasons the testing of wood fiber as a feed began in South Dakota, Kamstra noted. "There was a terrible shortage of hay in 1976," caused by a drought, he said.

In addition, the South Dakota Department of Game, Fish and Parks began extensive cutting of mature aspen forests in the state to improve wild game habitat. A use had to be found for all wood. Thus, Kamstra's program began.

Mature trees can be ground up in chipping machines, then pulverized, Kamstra said, utilizing the entire tree. However, tests have shown there is much more protein in immature trees and limbs. Niskanen believes farmers may someday plant and harvest forests of small, pole-like aspen trees.

"Because juvenile growth has the highest level of nutrients, we will see plantations of forests for cattle feed," Niskanen predicts.

"It's going to cause a new use of poor quality farmland. And there will be a more complete utilization of the biomass, rather than leaving the tree tops out there," he said.

Mechanized harvesting equipment will lower costs and facilitate such operations, he predicted.

Meanwhile, Cook has been feeding his cattle blends of aspen off and on since 1976, and has actively encouraged development of the budding industry, despite skepticism and criticism.

"We were laughed at. People said we were out of our tree," Cook said, straightfaced.

"It's no joke now."—*Doug Smith*, Duluth News-Tribune

Congress Considers Future of Three Endangered Species

Whether or not a butterfly species and two plant species will be allowed to survive is a question now being considered by Congress. The three species, classified as endangered by the U.S. Fish and Wildlife Service, receive protection under the Endangered Species Act of 1973. All are known only from California's Antioch Dunes. The dunes represent a unique, now-decimated habitat which borders the San Joaquin River in Contra Costa County, east of San Francisco Bay. Formerly occupying an area of about 500 acres, only about 80 acres remain, and much of this has been substantially altered.

The endangered Antioch Dunes butterfly, known as Lange's metalmark (*Apodemia mormo langei*), is a small, multi-colored species, belonging to the Riodinidae family, which flies during the late summer months. As a caterpillar, it feeds on only one species of plant, a buckwheat (*Eriogonum latifolium* var. *auriculatum*). The total Lange's metalmark population has recently been estimated at about 400. Sand excavation and rototilling has reduced the butterfly

Lange's metalmark (*Apodemia mormo langei*)
Photo courtesy L. Orsak

population directly and through destruction of the buckwheat plant.

The two endangered Antioch Dunes plants are the Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*) and the Antioch Dunes evening primrose (*Oenothera deltoides howellii*). Both were placed on the Endangered Species List in 1978. Approximately 1,500 plants of the cream-colored primrose survive. The condition of the yellow-blossomed wallflower, with only about 250 individuals left, is even more precarious. Both plants received publicity in 1979 when they were portrayed on the Endangered Flora U.S. commemorative postage stamp series.

These endangered organisms can survive only if the undeveloped dune remnants are preserved, say conservationists. The Fish and Wildlife Service has secured options to purchase the two remaining parcels, which total 56 acres. Purchase price is approximately $2.2 million. The area is prime industrial land, accounting for the high purchase price. Once obtained, the remnants would become a national wildlife refuge. Conservationists point out that attempts could then be made to increase populations of the three species so they could eventually be removed from the Endangered Species List.

Acquisition of the Antioch Dunes cannot proceed, however, without Congressional approval. Monies must be appropriated from the U.S. Land and Water Conservation Fund. In view of the continuing decline of both butterfly and wallflower populations, conservationists are anxious to see that the bill to appropriate funds is not held up in Congress and is passed prior to the expiration of the present options. If the purchase is not approved, claim conservationists, the [illegible] will almost certainly be developed or seriously altered, resulting in extinction for the endangered species.

The Lange's metalmark is only one of eight endangered or threatened butterflies. Six of these inhabit California, a region of increasing human population and diverse habitat. All these butterflies generally inhabit unique and diminishing habitats which are home for other very rare species.

One such butterfly, the El Segundo blue (*Euphilotes battoides allyni*), is a Los Angeles resident. It survives at only two locations. One is a 2-acre parcel owned and protected by Standard Oil of California. The species flies in greater abundance at the second site, part of the Los Angeles International Airport.

Motors Banned in Grand Canyon

After 10 years of public involvement and three of research, the National Park Service (NPS) has issued its management plan for the Grand Canyon section of the Colorado River. The plan, which begins a five-year phase-out of motorized craft this year, has brought strong opposition from concessionaires and applause from conservation groups. NPS Director William Whalen stated that a trip down the whitewater section through the Canyon should be "the epitome of a wilderness experience on a river in America." The plan hopes to protect the wilderness by spreading out use over a longer running season, instituting environmental safeguards (limiting boatload size, carrying out waste), and increasing the number of private permits (as opposed to commercial).

The Boating Industry Association, a trade association of marine manufacturers, charges that NPS is "limiting the river whitewhater experience to those with the time, money, and endurance to take a float trip," adding that the running time will double and cost increase 60–70 percent on the 235-mile trip. However, the new plan will permit trips from one to 20 days' duration.

Ice Conditioners?

Researchers at the University of Delaware are studying a new version of an old way to keep cool. Old way: put a block of ice in front of a fan to cool the air. New way: freeze a special salt water gel at night when energy rates and demand are lower, then use it during the day for cooling. Because the chemical involved freezes at approximately 55 degrees F., a home central air conditioning system can be used to freeze it, then to fan air across the frozen gel. Wide use of such "storage-assisted air conditioning systems" could reduce utility companies' oil consumption and investment in generators to meet peak loads. The estimated initial cost of $680 could save about $230 a year on electricity bills. Marketing is three years away, say researchers.

Wildlife Imports Increase

U.S. imports of wildlife items skyrocketed more than 9,000 percent between 1972 and 1977, reports TRAFFIC (Trade Records Analysis of Flora and Fauna in Commerce), the trade monitor for World Wildlife Fund-US. Game trophy imports rose 589 percent; skin and hides, 26 percent; live animals, 2 percent, and plants 446 percent, to total 164.6 million items in 1977.

Although the U.S. was the first of 51 countries to ratify the Convention of International Trade in Endangered Species (CITES), the federal government is having a difficult time monitoring trade increases at the nation's 8 wildlife and 14 plant ports of entry. For example, the Miami airport only has one U.S. Fish and Wildlife Service inspector at any one time to check hundreds of incoming shipments. TRAFFIC hopes to serve as a privately-operated data source to support and improve government efforts to regulate the boom. Initial efforts will focus on species, such as sea turtles, macaws, cacti, orchids, elephants (ivory), and crocodilians (leather), hardest hit by the international trade.

Environmental Protection Agency Announces "Seek and Find" Hazardous Waste Hot Line

The Midwest Regional Office of the U.S. Environmental Protection Agency (EPA) recently announced a new program "Seek and Find," to uncover improperly managed hazardous waste disposal sites throughout Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. By calling the toll-free Hazardous Waste Hotline, citizens can report known or suspected sites where hazardous waste material has been improperly disposed of or stored.

"Hazardous waste generation in the United States has increased dramatically since the end of World War II," said John McGuire, U.S. EPA regional administrator, "but the impacts of improperly managed hazardous wastes have only recently been recognized by the public as a critical issue. Until all such waste sites are located, potential threats to our health and the environment may sit unattended in fields and warehouses like ticking time bombs. The potential danger is too great to ignore."

The "Seek and Find" program will enable citizens to report suspected disposal sites in their community via the Hazardous Waste Hotline, a toll-free number. Illinois residents may call 800/972-3170, and residents outside Illinois may call 800/621-3191, Monday through Friday, 8:30 a.m. to 4:30 p.m.

ardous wastes may be found in
lds, abandoned buildings, along
es, or near wooded areas and
ands. Warning signs include
es of 55-gallon drums, strong
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waterways, and dead or dying
on in fields and woodlands.
gle sign or combination of signs
be reported," said McGuire.
s should not attempt to in-
on their own, as toxic fumes,
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be present."

ardous wastes are discarded
substances, usually stored in
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nature. Improper disposal of
ngerous wastes can cause con-
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n people and property through
indirect contact.

EPA estimates that of the 30–40
ons of hazardous wastes gener-
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properly managed. Major
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azardous wastes.

ee brochure on the "Seek and
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ies through the Office of Public
ion, U.S. EPA, Region V, 230
arborn St., Chicago, Ill. 60604,
ling (312) 353-2072.

gts Howl at Minnesota Wolves

wives, much like loners in society,
y ave little to howl about. Wolves
lo ot belong to a pack rarely re-
howling from other wolves.
nteresting aspect of wolf behavior
easons why wolves howl or re-
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ea period by research biologists
in wolf howls in the Superior Na-
Forest of northern Minnesota.
avid Mech, a research biologist
the J. S. Fish and Wildlife Service,
re H. Harrington, a biologist with
ivi on of Biological Sciences, State
ers y of New York, conducted the
t determine what role howling
in he maintenance of wolf terri-
Th biologists imitated wolf howls
cit responses from radio-collared
s tat could be located.

At s office in St. Paul, Mech, re-
ze internationally as a wolf expert,
vo al replies and behavior of
ed volves—in response to human
ng-were analyzed from eight wolf
an ten lone wolves. He said pre-
vious work by other researchers showed that free-ranging wolves respond to human imitations of howling as well as or better than playbacks of recorded howling by real wolves. Wolves apparently have the ability to distinguish individual voices. Agonistic responses from *Canis lupus* indicates, in the opinion of Mech, that wolves regard the human imitated call as howling from alien wolves.

During the experimental howling sessions, the biologists noted that wolves remained near their original site after howling, or retreated if they remained silent. The difference apparently was related to the problems of avoiding both accidental and eliberate encounters, and to "cost/benefit considerations" related to resources at the wolves' locations, according to Mech.

He said howling enables packs to avoid one another. The major benefit of replying to howling of alien wolves is the avoidance of an "accidental" encounter. The biologist reports that accidental encounters have been observed among wolf packs in Minnesota. Wolves are keenly defensive of and sensitive to territorial rights established by packs. Conflicts can arise when alien wolves enter a territory. "By howling," Mech said, "resident wolves advertise their position, allowing both resident and intruder to modify their movements to minimize the probability of an accidental meeting." The potential cost of replying, on the other hand, may be much greater than the energy required to howl because "advertisement announces the so-called advertisers' location and may subject them to attack, even by intruding wolves," he said.

Observations have been made in which intruding wolves located and attacked other wolves by following their adversaries' tracks in snow. Howling also could be used this way by wolves. Thus an important potential cost of replying to howling is the possibility of attack.

During the Minnesota study, the howling rate varied significantly throughout the year. A midwinter increase was correlated with the breeding season, especially for groups containing breeding animals. A second, larger increase in reply rate started in midsummer, peaked about August, and declined to a low in early winter. The decline in autumn howling response occurred sooner in a pack whose pups developed faster, Mech reports.

Study findings indicate the howling reply rate was significantly higher among all packs and lone wolves attending prey kills. The more food remaining at a kill, the higher the reply rate was.

Kills are valuable resources to wolves—resources not easily replaced, according to the biologists. Capturing and killing prey is a difficult and dangerous task. Most encounters between wolf packs and prey are unsuccessful. In other words, wolves generally must work hard when hunting for their dinners. A decline in the deer population in the area where the study was conducted reduced the number of available prey, so most kills were fully utilized by wolves. (Defense of a kill would be expected, Mech said, for even subordinate captive wolves can successfully defend their food from other more dominant wolves.)

During the study, larger wolf packs replied more often than did smaller packs. Howling enables a strung-out pack to reassemble, the biologists said. For wolves separated from their pack, the howling rate was dependent on the age and social role of pack members. Specific behaviors noted during howling sessions—including movements away from the howler—indicated that howling was related to interpack agonism, Mech said. Moreover, three of the major factors influencing the reply rate also significantly affect the level of agonism toward strangers, namely: pack size, social role, and breeding season.

Two other factors, kills and pups, are both important pack resources necessitating exclusive occupancy of a site, Mech said. The high reply rates at sites containing kills—or pups—constitute strong circumstantial evidence that howling is important in the maintenance of a territory.

Howling was considered most effective in mediating avoidance in two situations: (1) when two packs approached a common area of overlap; (2) when a pack returned to an area that was little used for weeks in which scent posts (spoor) would have lost effectiveness in deterring strangers (alien wolves).

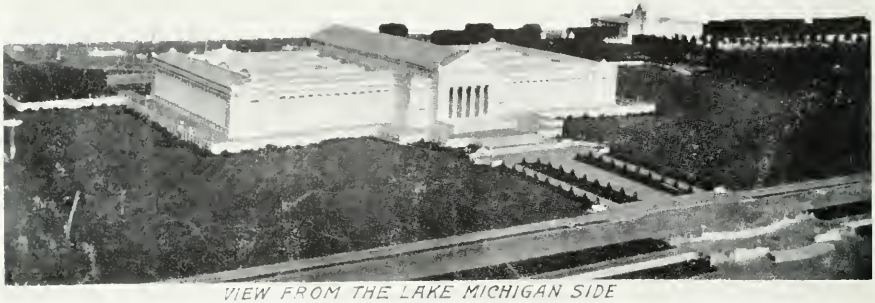
Both scent marking and howling apparently are important in spacing. However, scent marking and howling differ in their roles and are complementary; scent marking being long term and site-specific; howling being immediate and long range, in the words of Mech.

Lone wolves which do not possess territories rarely replied to human howling during the study, Mech said. Lone wolves shared the "low profile" behavior of surplus animals in a territorial population. Interpack howling sessions may continue for hours, he said. In Minnesota, three adjacent packs were heard howling, apparently to each other, each from within its own territory. After such sessions packs moved apart, suggesting their interpack howling occurs in an agonistic context, and thus may be involved in territorial maintenance.

The study answered questions about the role and importance of howling in territory maintenance. Radioed wolves replied to 494 of 1,783 trials during which biologists imitated wolf howls. Of the replies, 390 were recorded and 349 were of adequate quality for analysis.

FIELD MUSEUM *from the ground up*

VIEW FROM THE MICHIGAN AVENUE APPROACH



VIEW FROM THE LAKE MICHIGAN SIDE

Architect's drawings, rendered in 1908, of the Grant Park quarters proposed for the Museum. Note that the front of the building here faces west. The city subsequently rejected a proposal to construct the building at the north end of Grant Park. When it was finally built, at the park's south end, the building was turned 90 degrees, to face north.

On August 27, 1915, construction of the building is well under way. (It had begun a month earlier, July 26.) Plainly visible are buildings still to be seen 65 years later along Michigan Avenue, notably the Blackstone Hotel (opened 1910), at the right. The Illinois Central Station, with the peaked tower, left, was demolished in 1974.

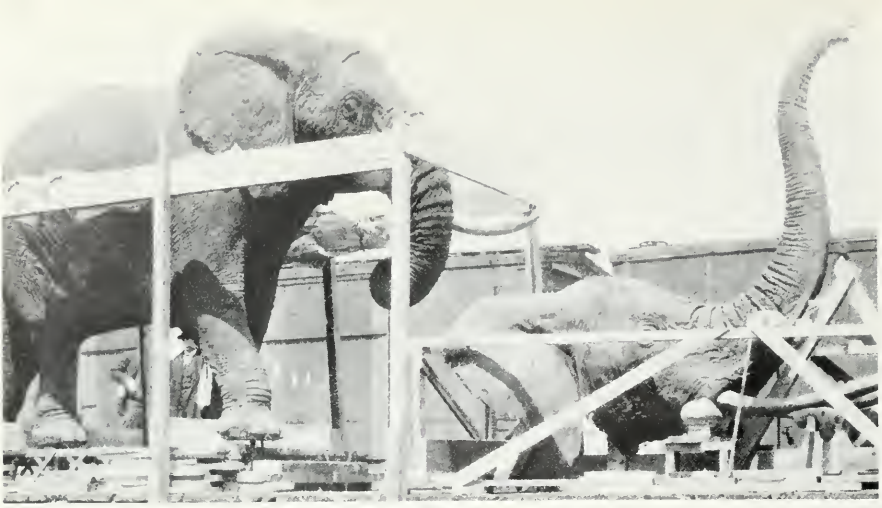
May 4, 1917. Twenty months have elapsed since the above photo was taken. The foundation now appears complete.

FIFTY-NINE YEARS AGO, on May 2, 1921, Field Museum celebrated a kind of housewarming—the opening of its superb new quarters in Grant Park. It had been just 27 years—less a month—since the Museum's original building had opened *its* doors in Jackson Park, just four miles south of the new Grant Park location. But the original building, quickly constructed for use during the World's Columbian Exposition, was doomed to self-destruct in a very short space of time. In little more than a decade, for example, the building's exterior was sloughing off, creating an eyesore that was impractical and too costly to correct. The floor space in the Jackson Park building also soon proved to be inadequate for the rapidly expanding collections. The only sensible solution, the trustees decided, was to find new quarters. The result was the construction of the present building, begun on July 26, 1915. The photos reproduced here tell part of the story of its construction and of the relocation of the collections.

June 5, 1919. The main structure of the Museum building (behind the camera) is now essentially complete. Shown here is the underground railway, subsequently covered by landfill, used to convey coal to, and ashes from, the Museum's original furnaces. The railway connected with a much larger system, many miles in length, that still underlies much of downtown Chicago.

August 21, 1917. Two years since ground was broken; the building is taking shape.

About 1920. What must have been a sea of mud surrounds the completed Museum. The underground railway (shown above) has been covered. Landfill extending into Lake Michigan is still to be added on three sides of the building.



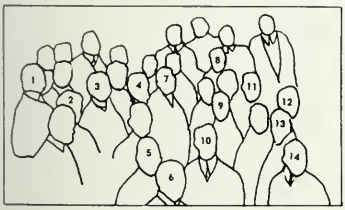
The famed fighting bull elephants, shot by Carl Akeley in 1906 and put on display in 1909, ride ignominiously on railroad flatcar from the Jackson Park building to the new quarters in Grant Park, four miles north. The taller of the two elephants has been temporarily decapitated for the journey.

Movers with one of the hundreds of display cases, outside the Jackson Park building.

Specimens and cases not carried by rail were transported by truck. Shown leaving the Jackson Park building.

building—though scarcely 25 years old—is clearly visible behind the locomotive. About 1920

Cornerstone ceremonies at the new Museum building, September 28, 1917. Those present included (1) paleontology curator Elmer S. Riggs, (2) anthropology curator A. B. Lewis, (3) anthropology curator Berthold Laufer, (4) botany curator Charles L. Millspaugh, (5) geology curator Henry W. Nichols, (6) insects curator William J. Gerhardt, (7) director Frederick J. V. Skiff, (8) director David C. Davies, (9) zoology curator Wilfred H. Osgood, (10) accountant Benjamin Bridge, (11) director S. C. Simms, (12) anthropology curator Fay Cooper Cole, (13) botany curator B. E. Dahlgren, (14) security chief Charles L. Owen.



Opening day of the new Grant Park quarters of Field Museum, May 2, 1921.

*Why Not Eat Insects?**

By Vincent M. Holt

IN entering upon this work I am fully conscious of the difficulty of battling against a long-existing and deep-rooted public prejudice. I only ask of my readers a fair hearing, an impartial consideration of my arguments, and an unbiassed judgment. If these be granted, I feel sure that many will be persuaded to make practical proof of the expediency of using insects as food. There are insects and insects. *My* insects are all vegetable feeders, clean, palatable, wholesome, and decidedly more particular in their feeding than ourselves. While I am confident that they will never condescend to eat *us*, I am equally confident that, on finding out how good they are, we shall some day right gladly cook and eat *them*.

Insects That Are Good to Eat; and Something about Their Cooking.

WE have seen that, from the time of Moses down to the present day, various members of the insect family of *Orthoptera*, which includes the locusts, crickets, and grasshoppers, have been and are eaten and appreciated in many parts of the world. Now let us look at home, and consider why we should not do likewise, adding to our tables that clean meat, "the grasshopper after his kind." We are not without precedent. The example of the Church has backed up the written permission of the Bible. The Rev. R. Sheppard, many years ago, had some of our common large grasshoppers served up at his table, according to the recipe used by the inhabitants of Morocco in the cooking of their favourite locusts. Here it is. "Having plucked off their heads, legs, and wings, sprinkle them with pepper and salt and chopped parsley, fry in butter, and add some vinegar." He found them excellent. From personal experiment I can fully endorse his opinion; and there are few who would not, if they would but try this dish. I have eaten them raw, and I have eaten them cooked. Raw, they are pleasant to the taste; cooked, they are delicious. The above recipe is simple; but any one with a knowledge of cookery would know how to improve upon it producing from this source such dishes, say, as "Grasshoppers au gratin," or "Acridae sautés à la Maître d'Hôtel."

Among the *Coleoptera* or Beetles, we find many which might well serve as food; some in their larval, some in their complete state, and some in both. Here, again, there is no need to recruit from among the ranks of the carnivorous or foul feeders. There are without those plenty of strict vegetarians.

The grub of the Stag Beetle (*Lucanus cervus*) is said by many, as before mentioned, to be identical with the Cossus, which the Romans used to fatten for the table upon flour and wine. As this destructive grub, before turning to its beetle stage of life, spends some years gnawing at the hearts of our oak treas, it would be a boon to timber growers if this taste of the Romans were revived. There are many varieties of these timber-borers which might well be used for food, as are the Grugru and the Moutac grub in the East and West Indies. I have especially noticed a plump white grub which infests our young sallow trees in great numbers, boring upwards from the foot of the stem. When the plantations are cut down, why should this delicacy be wasted? If foolishly rejected at the tables of the rich, these larvae should be a joy to the woodman's family, and a reward for the toil of the breadwinner. If this were so, it would be the means of keeping down the number of these destructive pests, which are not now considered worth collecting.

What valid objection can there be to eating these insects, when the larvae of similar beetles are eaten all over the world, both by natives and by whites and when such larvae are unanimously pronounced to be wholesome and palatable?

The Meal-worm, the larva of a small beetle (*Tenebrio*), is generally looked upon with disgust, as only fit food for tame birds. Even the strong-stomached and hungry sailor will rap his sea-biscuit on the table to shake out the worms before eating it. Let him shake out the worms, by all means; but let him collect them, fry in lard, and spread the dainty upon his dry biscuit. He will not again throw Meal-worms away.

In the common Cockchafer (*Melolontha vulgaris*) we find an inveterate enemy, which, after spending three years in gnawing the roots of our clover and grasses as a huge white grub, turns to its beetle state, only to continue its ravages upon the foliage of our fruit or forest trees. Literally tooth and nail we ought to battle with this enemy, for in both its stages it is a most dainty morsel for the table. The birds are more sensible than we. They know well the value of the fat chafer as food. With what joy the jaunty rooks, following the plough with long strides over the upturned clover lea, pounce upon the luscious grubs! What a feast the birds have among the swarms of chafers in the tall tree-tops!

Erasmus Darwin, in his "Phytologia," says: "I have observed the house sparrow destroy the Maychafer, eating out the central part of it, and am told that turkeys and rooks do the same; which I thence conclude might be grateful food, if properly cooked, as the locusts or termites of the East. And probably the large grub, or larva of it, which the rooks pick up in following the plough, is as delicious as the grub called Grugru, and a large caterpillar which feeds on the palm, both of which are roasted and eaten in the West Indies." Here is the openly expressed opinion of one of our greatest philosophers and deepest thinkers; and there is not the slightest doubt that it is correct.

Again I endorse from personal experience. Try them, as I have; they *are* delicious. Cockchafers are not only common, but of a most serviceable size and plumpness, while their grubs are, when full grown, at least two inches in length, and fat in proportion.

What a godsend to housekeepers to discover a new *entrée* to vary the monotony of the present round! Why should invention, which makes such gigantic strides in other directions, stand still in cookery? Here then, mistresses, who thirst to place new and dainty dishes before your guests, what better could you have than "Curried Maychafers"—or, if you want a more mysterious title, "Larvæ Melolonthæ à la Grugru"? Landowning guests ought to welcome the opportunity of retaliating, at your table, under the "lex talionis," upon this, one of the worst of their insect tormentors. Another dish, which should take with the farmer, would be "Fried Chafers with Wireworm sauce." Perhaps, however, the little word "worm" might be objected to. So let us pander to the refined senses of the delicately fastidious by writing it upon our *menu* as "Fried Melolonthæ with Elater sauce." I know that wireworms are an excellent substitute for shrimps. There are, also, thousands of members of the same family as the shrimp (*Crustaceans*) in every garden, namely, the common Wood-lice (*Oniscus muriarius*). I have eaten these, and found that, when chewed, a flavour is developed remarkably akin to that so much appreciated in their sea cousins. Wood-louse sauce is equal, if not distinctly superior to, shrimp.

The following is the recipe: Collect a quantity of the finest wood-lice to be found (no difficult task, as they swarm under the bark of every rotten tree), and drop them into boiling water, which will kill them instantly, but not turn them red, as might be expected. At the same time put into a saucepan a quarter of a pound of fresh butter, a teaspoonful of flour, a small glass of water, a little milk, some pepper and salt, and place it on the stove. As soon as the sauce is thick, take it off and put in the wood-lice. This is an excellent sauce for fish. Try it.

Passing on to the order *Hymenoptera*, the Sawfly at once strikes us as a very familiar insect, which in its larval stage plays sad havoc among the gooseberry bushes, often stripping them bare of

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**Originally published in England in 1885. The material reproduced here is an excerpt from the paperback edition of the book now in print.*

leaves, and thus spoiling all chance of fruit. We all know in what myriads the grub swarms upon the trees, and how hard it is to induce our gardener, or any one else, to take timely steps for its destruction. If it were known to be nice to eat, there would be little fear of this voracious feeder carrying on its destruction uninterrupted. It would be a race between the cook and the gardener's wife, who should first arrive at the poor gooseberry bush. There is also the Turnip Sawfly, better known to farmers as "the Black," which sometimes devours whole fields of roots, leaving not a leaf to be seen. In this order are included Bees and Wasps. From the former we already derive a delicious sweet in the form of golden honey. From the latter we might, if we chose, derive an equally delicious savoury. What disciple of old Izaak Walton, when he has been all the morning enticing the wily trout with luscious wasp grubs baked to a turn, has not suspected a new and appetizing taste imparted to his midday meal of bread and cheese or sandwich? Perhaps his own meal has travelled to the scene of action in the same basket as the rich cakes of grubs; or it may be that the fish are biting too well to allow time for a thorough handwashing, and rapid bits are taken from the lunch in the intervals between the bobbing of the float and the replacing of the nibbled grubs. At any rate, it will, sometimes, so happen to every fisherman to get the taste and smell of cooked wasp grubs with his meal, and I have never noticed that it in any way spoilt his appetite. Attracted by the said taste and smell, and having no prejudices against insect food, I have myself spread the baked grubs upon my bread, and found their excellent flavour quite sufficient to account for the fondness of the trout for this particular bait. I will admit that wasps are occasionally carnivorous, but it is the exception and not the rule. Moreover, the saccharine fluid with which they feed their infant grubs is, I believe, entirely composed of vegetable juices, drawn from ripe fruits and flowers. Their babes, like our own, are fed only upon what are called "spoon victuals." Let us, then, welcome among our new insect dishes "Wasp grubs baked in the comb." The number of wasps' nests taken and destroyed, in a prolific season, is something extraordinary. I have known as many as sixteen or twenty nests to be taken by a gardener within a very short radius round his house. What a waste of good wholesome food takes place then, when cake after cake, loaded with fat grubs, is stamped under foot! The next order, the *Lepidoptera* (butterflies and moths), is rich in material for practical experiment and demonstration of my theory of insect food for omnivorous man. The usual stock terms for insects, "hideous," "loathsome," etc., cannot be applied with any justice to this class, which, in its perfect state is renowned for its elegant beauty, and in its larval or caterpillar state is almost invariably pleasingly coloured and by no means repulsive to the eye. Their diet, too, is of the most purely vegetarian description, consisting, as it does, in the first stage of leaves, and the sweet nectar of flowers in the second. The tiny ant knows and appreciates the sweetness of insects which feed upon the juices of plants or flowers, for it keeps and tends with care numerous milch herds of aphides or green flies, to coax from their plump bodies the pearly drops of the honey dew it loves so well. We have always been taught that in many points the ant is to be imitated. In its just appreciation of insects as a sweet source of food it is to be imitated too. I think it is in "Swiss Family Robinson" that there is a clever account of some travellers, wandering at night through a forest by torchlight, being greatly annoyed by huge moths, which repeatedly extinguished the torches by their suicidal love of light. However, annoyance was turned to joy when, tempted by the appetizing smell of the toasted moths, the hungry travellers ventured to satisfy in part their hunger with the suicides, which they found as excellent in flavour as in smell. From what I recollect of the tale, I believe this was quite a fancy description, probably founded on the real habits of the natives which had been observed by the travelled author of the book. I well remember that, on reading that account, my youthful imagination reproduced without effort the appetizing smell of a plump baked moth; but it did not occur to me then to try such a tid-bit. Lately, however, I have done so, to find the dream of my childhood fully realized as to the delights, both in taste and smell, of a fat moth nicely baked. Try them, ye epicures! What possible argument can be advanced against eating a creature beautiful without and sweet within; a creature nourished on nectar, the fabled food of the gods?

In attempting to reconcile the popular taste to the consumption of this same order in its larval stage as "caterpillars," a more difficult task perhaps awaits me. But why? I never could thoroughly understand the intense disgust with which the appearance at the dinner-table of a well-boiled caterpillar, accidentally served with cabbage, is always greeted. The feeling is purely one of habit, and the outcome of unjust prejudice. These delicate, shuddering people, who now, with appetites gone, push away their plates upon the appearance of a well-cooked vegetable-fed caterpillar, have probably just swallowed a dozen live oysters; or they may have partaken of the foul-feeding lobster, and are perhaps pleasantly anticipating the arrival of a dish of ungutted woodcock! I have pointed out before that we have Dr. Darwin's authority that the caterpillars of the sphinx moths, as eaten by the Chinese, are very palatable; and another traveller has told us that he found the caterpillars eaten by the Hottentots tasted like almond paste. Of course, in choosing caterpillars for eating, it is necessary to discriminate between those feeding on poisonous and non-poisonous plants; but there is no more difficulty in this than in distinguishing between the edible and poisonous in berries or fungi.

The caterpillar pests swarming in our kitchen gardens, which might with advantage be collected for food, are really too numerous to be fully described here, but I will point out a few of the best; at the same time calling attention to the fact that they all feed upon the wholesome vegetables which we cultivate for our own eating. To begin, the large white cabbage butterfly (*Pontia brassicae*) is one of our most familiar butterflies. Its caterpillar, when full-grown, is one and a half inches in length, and, owning to its unpleasant habit of living upon his cabbages, of which it usually leaves nothing but skeleton leaves, is too well known to every gardener. It is of a greenish colour upon the back, yellow underneath, striped with yellow along the back and sides, spotted all over with black, and covered more or less with tiny hairs. Miss Eleanor Ormerod says, with reference to these pests, "Hand-picking the caterpillars is a tedious remedy, but where there is no great extent of ground, it is advisable as a certain cure."

This effectual remedy would no longer be looked upon as tedious if the fruits of the picking were to form a dish for the gardener's dinner, or appear in the *menu* of his mistress as "Larvæ Pontiæ à l'Hottentot." Again she says, "When the first brood of caterpillars are full-grown, and have disappeared from the cabbages in early summer, they have left them to turn to chrysalids in any sheltered nook near, and may be collected in large numbers by children for a trifle per hundred. They may be chiefly found in outhouses, potting-sheds, and the like places, in every neglected corner, under rough stairs, step-ladders, or beams or shelves, or fastened against rough stone walls or mortar." Why should we not imitate the Chinese, who, as I have stated, eat the chrysalids of silkworms?

Silkworms feed on the mulberry, lettuce, etc.; these caterpillars upon the homely cabbage. Let us, then, cast aside our foolish prejudice, and delight in chrysalids fried in butter, with yolk of eggs and seasoning, or "Chrysalids à la Chinoise."

The foregoing remarks apply equally to the small white cabbage butterfly (*Pontia rapae*), whose caterpillars are smaller, of a green colour, and velvety, having a stripe of yellow along the back, and spots of the same colour along the sides.

Sticking still to cabbage, we next have the cabbage moth (*Mamestra brassicae*), whose caterpillar is perhaps more generally known as a forward intruder at table

than any other. The larva is about an inch and a half in length, varies a great deal in colour, from dirty flesh to green, and is smooth and naked-looking. Its constant habit of gnawing right down into the heart of any cabbage or cauliflower attacked renders it a great nuisance in the garden, and also accounts for its frequent, and at present uninvited, appearance in a boiled state at the dinner-table....

Continuing the list, I will next mention the large yellow underwing moth, whose caterpillar feeds upon turnip and cabbage leaves. The moth itself is a very familiar sight, its size and yellow underwings rendering it a conspicuous object when, disturbed from its day retreat, it rises with sluggish flight before us. In seasons when this moth is numerous great numbers might be caught, both in the daytime and at night, with the net and by sugaring trees as practised by moth-collectors. When nicely fried in butter, their plump bodies rival the torch-cooked delicacies of the traveller's tale. Again, there is the common Buff-tip, a handsome moth, with forewings of a beautiful grey colour, marked with ruddy and black patches, and tipped, as its name imports, with light buff. It is handsome. What is more, let me whisper the ogreish suggestion that its body, an inch in length, is plump, round, and sweet. Its caterpillars are well known to every one, whether Londoner or countryman, for they swarm, at the end of June, in town and country alike upon their favourite lime trees. Their yellow forms, striped and ringed with black, are often to be seen crawling across the arid desert of the London pavements in search of some congenial soil wherein they bury themselves for the term of insect purgatory. Looking up then at the tree from which these wanderers have descended, one may see branches, perhaps many, perhaps few, stripped of their foliage and down the stem other caterpillars hurriedly crawling, knowing that their time has come; that nature calls them to throw off their gay garments and humble themselves beneath the soil, before bursting out into rollicking Buff-tips. It never strikes the Londoner, as he hurries along beneath the shady trees, that these caterpillars are good to eat. He either stamps upon or carefully avoids them, according to his nature. The street boy picks up, plays with, and finally squashes them; but the extraordinary part of it is that it never strikes him to taste them. Boys taste almost everything. But this prejudice against insects seems rooted in them from the earliest age, for I have never seen a child experiment upon the unknown sweets of insect food. These Buff-tip caterpillars swarm upon the trees in such numbers, in favourable seasons, that many a dish can be obtained with a little trouble, which is amply repaid not only by their favour but also by the saving of the tender foliage of the limes. Most of the commoner moths which flit in thousands by night, around our fields and gardens, have nice fat carcases, and ought certainly to be used as food. Why, they are the very incarnescence of sweetness, beauty, and deliciousness; living storehouses of nectar gathered from the most fragrant flowers! They, too, voluntarily and suggestively sacrifice themselves upon the altar of our lamps, as we sit, with open windows, in the balmy summer nights. They fry and grill themselves before our eyes, saying, "Does not the sweet scent of our cooked bodies tempt you? Fry us with butter; we are delicious. Boil us, grill us, stew us; we are good all ways!"...

We do not find many instances of slugs being generally eaten, unless as a remedy for lung diseases; but I fail to see why, seeing how nearly they are allied to snails, they should be so generally neglected.

The great grey slug *(Limax maximus)*, the red slug *(Limax rufus)*, the black slug *(Limax ater)*, and the small grey slug are all to be found in great numbers in most parts of England, and when properly cooked are all equally good....

Why should not these be gathered in hundreds and thousands by the poor for food? The larger varieties might be treated like the Chinese delicacies, the sea-slugs, cut open and dried for keeping....

Let not the labourer say, "We starve. Meat is too dear; bread is almost as dear because the wire-worm, the leather-jacket, and the May-bug worm have thinned the crop; our little stock of flour is rendered useless by meal-worms. The caterpillars swarm upon our cabbages; the sawfly has spoilt all chance of the gooseberries we hoped to sell: hosts of great slugs and snails have devoured what the others left. Upon our fruit trees the cockchafers are gnawing the leaves to bareness."

Yes, meat is dear; but the wheat crop would have been twice as thick if the wireworms, the leather-jackets, and the luscious white chafer grubs had been diligently collected by you for food. Mealworms are fattening. You should have hand-picked your cabbages and gooseberry trees, so that you might enjoy and profit by their would-be destroyers. The snails and slugs ought to be welcome, and sought for, to be placed in your little snail-preserve. As for cockchafers, you ought to get sixpence a score for them from the squire's housekeeper. They are, like mushrooms, to be gathered and sold as delicacies; or you could fry them for your own suppers, before they have a chance of baring your poor fruit trees. Thus you would not only save all the produce of the little garden, but also pleasantly vary your monotonous meal with wholesome and savoury dishes.

Nature, if undisturbed, balances all her creatures against each other so that no one individual kind shall, increase and multiply to an undue extent....

When not interfered with, Nature's whole machinery works with perfect regularity, and her balance is exactly poised. If, however, we presume to intermeddle, the whole system soon becomes deranged. By importing or cultivating fancy fruits unnatural to the soil, we have interfered with the machinery; by killing the birds to protect these fancy fruits, we destroy Nature's balance of her creatures—for birds are the natural counterpoise to insects. In consequence we have, to the great detriment of our crops, an overweight and undue increase of insects. To save them from their devourers, we must throw some extra weight into the opposite scale to compensate for the loss of the birds we kill. I have done my best to show how this weight may be added, and how the balance may be restored....

Suggested menus

I

French

Potage aux Limaces á la Chinoise.
Morue bouillie á l'Anglaise, Sauce aux Limaçons.
Larves de Guêpes frites au Rayon.
Phalénes á l'Hottentot.
Bœuf aux Chenilles.
Petites Carottes, Sauce blanche aux Rougets.
Crême de Groseilles aux Nemates.
Larves de Hanneton Grillées.
Cerfs Volants á la Gru Gru.

English

Slug Soup.
Boiled Cod with Snail Sauce.
Wasp Grubs fried in the Comb.
Moths sautés in Butter.
Braized Beef with Caterpillars.
New Carrots with Wireworm Sauce.
Gooseberry Cream with Sawflies.
Devilled Chafer Grubs.
Stag Beetle Larvæ on Toast.

II

French

Potage aux Limaçons á la Française.
Soles frites, Sauce aux Cloportes.
Hannetons á la Sauterelle des Index.
Fricassée de Poulets aux Chrysalides.
Carré de Mouton, Sauce aux Rougets.
Canetons aux Petits Pois.
Choufleurs garnies de Chenilles.
Phalénes au Parmesan.

English

Snail Soup.
Fried soles, with Woodlouse Sauce.
Curried Cockchafers.
Fricassée of Chicken with Chrysalids.
Boiled Neck of Mutton with Wireworm Sauce.
Ducklings, with Green Peas.
Cauliflowers garnished with Caterpillars.
Moths on Toast.

May and June at Field Museum

(May 15 through June 15)

New Exhibits

"Gold of El Dorado: The Heritage of Colombia." This is your chance to view hundreds of the glittering gold treasures that inspired the legend of El Dorado. Jewelry, musical instruments, hunting and fishing gear, and cooking utensils—all crafted from the valuable metal—acquaint us with a lost civilization. This exhibit is the largest display of Colombian archeology ever seen in the United States. Exhibit curator: Michael Moseley; designer: David Edquist. Through July 6: Hall 27, 2nd Floor.

"Patterns of Paradise" explores the history and cultures of the South Sea islanders through one of their most important surviving handicrafts—the art of creating tapa, or decorated bark cloth. More than 200 objects, nearly all of them from Field Museum's own magnificent collections, are on display—dance masks, fine mats, wood carvings, costume accessories, and tools. Exhibit curator: John Terrell; research specialist: Anne Leonard; designer: Donald Skinner. Through June 8: Hall 26, 2nd floor.

Continuing Exhibits

"Cash, Cannon and Cowrie Shells: The Nonmodern Moneys of the World" contains over 80 varieties of money used by ancient cultures. The exhibit explores the origins, values, and meaning of nonmodern money in terms of buying power for 50 Old World civilizations. Ground floor, between Halls K and L.

"Pawnee Earth Lodge." Hall 5 contains a full-scale replica of a Pawnee earth lodge, the home and ceremonial center of Pawnee Indians in the mid-1800s. Daily public programs provide opportunities to learn about Pawnee culture: Monday-Friday 12:30 p.m.; Saturdays 11 a.m., 12:15 p.m., and 1:15 p.m. Open House on Sunday from 11 a.m. to 3 p.m.

"The Place for Wonder." This gallery provides a "hands-on" approach to natural history. Feel the skin of a rattlesnake, try on a bamboo backpack from China, examine a dinosaur bone, and more—this room is full of touchable exhibits. Trained volunteers help guide exploration and answer questions. Open weekdays 1 to 3 p.m.; weekends 10 a.m. to noon and 1 to 3 p.m. Ground Floor, near cafeteria.

New Programs

Gold of El Dorado Film Series: "The People of Colombia." Free films of the heritage and civilizations of Colombia are offered in Lecture Hall I each Friday, Saturday, and Sunday at 11 a.m. and 2 p.m. These films will be shown for the duration of the "Gold of El Dorado: The Heritage of Colombia" exhibit. Film notes are available in braille, as well as in regular and large print. The series is made possible by a grant from the National Endowment for the Humanities, a federal agency.

Gold of El Dorado Lecture Series. Planned in conjunction with the "Gold of El Dorado: The Heritage of Colombia" exhibition, this series features experts on Colombian art, technology, and archeology. Two lectures remain in the series, held on Fridays, 8 p.m. in the Simpson Theatre. Tickets for each lecture (Members $2.00, nonmembers $3.50) are available at the West Door before the program. The lectures are accompanied by a signer for the deaf; program notes are in braille as well as in regular and large print. The series is made possible by a grant from the National Endowment for the Humanities, a federal agency. May 16: "Technology of Goldworking in Pre-Columbian South America," with Dr. Heather Lechtman of the Massachusetts Institute of Technology. May 23: "Gold in Pre-Columbian Cultures," with Dr. Donald Thompson of the University of Wisconsin.

Gamelan Mini-Concerts. Hear Field Museum's magnificent gamelan, a 24-piece Sudanese (West Javanese) ensemble of wood and bronze instruments. The music, with its clear sweet tones, has been compared to the sound of a cascading waterfall. These free concerts are presented by the Museum's gamelan classes, under the direction of Sue Carole DeVale. Sunday, June 8, 2 p.m.; Sunday, June 15, 2 p.m. Hall K, ground floor.

Indian Classical Dance Demonstration. Indian classical dance is a combination of art, religion, and philosophy. The leading exponent of the Odissi style of classical dance, Priyambada Mohanty, will give a lecture/demonstration of this graceful and lyrical art. Together with her 14-year-old daughter, Mohanty will explain and perform the movements, postures, and emotions of the dance. Saturday, June 14, 2:30 p.m. For ticket information, call 922-3136.

Weekend Discovery Programs. Each Saturday and Sunday, the Museum offers a variety of free tours, demonstrations, and films. Check the "Weekend Sheet" available at Museum entrances for additional programs and locations.

- "The Tribal Eye" Film Features: "The Crooked Beak of Heaven." A Northwest Coast Indian chief bestows gifts on his tribesmen and then smashes his own valuable possessions during the potlatch ceremony. Saturday, May 17, 1 p.m.
- "Indians of North America." Half-hour tour focuses on the daily life of six tribes. Saturday, May 17, 2:30 p.m.
- "Napoleon in Egypt—III." This slide presentation examines how early expeditions laid the foundations for modern Egyptology. Sunday, May 18, 1:30 p.m.
- "Ancient Egypt." Learn about the traditions of ancient Egypt in this 45-minute tour. Saturday, May 24, 11:30 a.m.
- "The Tribal Eye" Film Features: "Man Blong Custom." This BBC documentary explores virtually unknown villages in the jungles of New Hebrides. Saturday, May 24, 1 p.m.
- "Culture and History of Ancient Egypt." This 45-minute tour focuses on the ancient Egyptian artifacts in the Museum. Sunday, May 25, 1 p.m.
- "The Tribal Eye" Film Features: "Across the Frontiers." This film offers a summary of tribal ways, and contrasts them with the ever-changing modern world. Saturday, May 31, 1 p.m.
- "Animal Adaptations" Film Features: "Adaptations to Ocean Environments" features animals living in the oceans of the world. "Saga of the Sea Otter" focuses on this animal

(Continued on back cover)

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May and June at Field Museum

(Continued from inside back cover)

population off the coast of California. Sunday, June 1, 1 p.m.

- "The World of Gold." This 30-minute tour surveys gold's physical properties, and gold-mining procedures. Saturday, June 7, 12:30 p.m.
- "Ancient Egypt." Saturday, June 14, 1 p.m.
- "Animal Adaptations" Film Features: "Adaptations of Insects" reveals four methods by which insects adapt to unfavorable conditions. "The Mayfly: The Ecology of an Aquatic Insect" shows the life history of mayflies. Sunday, June 15, 1 p.m.

Ray A. Kroc Environmental Field Trips. Spaces are still available for selected one-day field trips in May and June. Call 922-3136 for more information.

Continuing Programs

Spring Journey: "Pacific Isles: A Voyage to the South Seas." Learn about the cultures of Micronesia, Polynesia, and Melanesia through this self-guided tour. Free Journey pamphlets available at Museum entrances.

Friend or Foe? The Natural History Game. The object here is to determine which one of a pair of apparently similar specimens is harmful and which is not. See if you can distinguish a vampire bat, a headhunter's axe, a poisonous mineral, or a deadly mushroom for its benign look-alike. Ground floor, no closing date.

On Your Own at Field Museum. Self-guided tour booklets, adult- and family-oriented, are available for 25¢ each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with scientific interests and backgrounds are needed to work in the various departments. For more information call Volunteer Coordinator, 922-9410, ext. 360.

"The Ancient Art of Weaving." Learn about age-old weaving techniques and textile development during these free demonstrations. Monday, Wednesday, and Friday from 10:00 a.m. to noon. South Lounge, 2nd floor.

May and June hours. The Museum is open daily 9 a.m. to 6 p.m., except Fridays. On Fridays the Museum is open 9 a.m. to 9 p.m.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor. Closed Memorial Day, Monday, May 26. Obtain a pass at the reception desk, main floor.

Museum telephone: (312)922-9410

Patterns of Paradise exhibit, featuring tapa cloth, will be on view in Hall 26 through June 8. Exhibit design by Don Skinner.

Ron Testa

June
1980

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

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Field Museum of Natural History

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COVER

The camera of David Muench, of Santa Barbara, CA, captures the surreal effect of sand wavelets in Monument Valley, Arizona—the heart of Navajo country. Featured in this issue (see pp. 11-18) is the remarkable Navajo rug collection of Dr. Karl A. Menninger and Mrs. Menninger.

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FIELD MUSEUM TOURS

1980 Tour Packages Exclusively for Members

The Classical Lands:
Greece and the Grecian Isles
September 7-26

Under the leadership of Dr. Donald Whitcomb, Field Museum assistant curator of Near Eastern archeology and ethnology, this tour will visit Athens, the sites of ancient Corinth and Mycenae, Delphi, Olympia, Knossos, Santorini, the island of Rhodes, Miletus, Skiros, Piraeus, and numerous other sites of interest in the history of western civilization and art.

Following six days and five nights in Athens, the sleek luxury motor yacht *Cavo D'Oro*, with 30 passenger cabins, will take tour members across the shimmering waters of the Aegean to some of the loveliest and most historically interesting of the Greek Isles.

Cost of the tour—$3,425 (plus a $300 donation to Field Museum)—is based upon double occupancy and includes round trip air fare via American Airlines between Chicago and Greece. First class accommodations will be used throughout. The package includes almost all meals (all meals while aboard the *Cavo D'Oro*), motorcoach fares, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $300 per person.

Wisconsin's Baraboo Range
June 21-22

Dr. Edward Olsen, curator of mineralogy, will lead tour members through the Baraboo Range and along the shores and hinterland of beautiful Devil's Lake. The Baraboo Range is of special interest as a *monadnock*—what is left of an ancient mountain range and which now stands out above the younger rocks and sediments. The range consists of quartzite—more than one billion years old—which, although compressed in places into vertical folds, retains the original sedimentary structures. The mountains were further modified by glaciers, forming the lake and the picturesque glens, and changing the course of rivers.

Overnight accommodations and meals will be at the Dell View Motel, located in a lovely pine grove on Lake Delton, at Wisconsin Dells. Hiking clothes are strongly recommended for the scheduled hikes. The trip is not suitable for children, but younger people interested in natural history are welcome. The cost of the Baraboo trip is $95 per person (double occupancy).

Below: Site of ancient Mycenae will be visited by members of September tour to Greece and Grecian isles.

Harbor of Argentine research station, Almirante Brown, on Antarctic Peninsula, showing the cruise ship, M.S. World Discoverer, *at left.*

Project Antarctica: 1980

Field Museum's January Tour for Members to the Antarctic Peninsula

TEXT AND PHOTOS BY EDWARD OLSEN

There was a time, not long ago, that the Antarctic continent was seen only by a select few. Transport there was first a matter of ships—ships with sails, then steam, finally diesel. Airplanes have, in the past 25 years only, opened the continent to exploration and relatively easy access. Nevertheless, it remains the largest unexplored land area on this planet. It is 5½ million square miles, the size of the whole United States plus all of Mexico; but only a few thousands of square miles have been seen, first hand, on the ground, by anyone.

The list of early explorers who entered this southernmost region—some of them never seeing the actual Antarctic continent itself, some making sightings and landings, some trekking into the bitter, hostile interior—is long: Cook, Bellingshausen, Palmer, Amundsen, Scott, Wilson, Mawson, Shackleton, Ross, Ronne, Byrd... Most of these men came, made their observations, and left. Some, like Shackleton, suffered overwhelming hardships and retreated. Some, like Scott, succumbed to the bitterly harsh conditions and perished there.

The Antarctic continent today remains largely in the hands of individuals of the same cut. Each Antarctic summer, November through February, teams of geologists, biologists, and

Edward Olsen is curator of mineralogy.

physicists from a dozen different nations enter the continent by plane and ship to examine, map, and collect. Some of these scientists remain during the fierce winter months to continue gathering data. The Antarctic Treaty, signed by seventeen nations and ratified in 1961, has set aside the continent, and the islands that surround it, for scientific study until the year 1991. In the meantime, no one may exploit the region for commercial, political, or military advantage. Like the open ocean, it is truly international.

Tourism to Antarctica is a relatively recent phenomenon. From time to time, over the past 40 years, individuals with a strong desire for adventure have endured journeys there in small sailing yachts, touched the continent, and then returned. Over the past decade, however, tours aboard modest-sized passenger ships have come into being. The first of these vessels was the motorship *Lindblad Explorer*, which has made many annual voyages from the tip of South America to the Antarctic Peninsula—that long mountainous projection of the Antarctic continent which points northward towards Cape Horn. And, on at least one occasion, the *Lindblad Explorer* has skirted the coast of the Antarctic continent, making landings at points immediately south of New Zealand.

About three or four years ago a somewhat different form of tourism came into being: Commercial airlines from New Zealand and Australia began to offer overflights of the continent that do not land, but view the South Pole, the Transantarctic Mountains, and several of the scientific research stations from the air. (One of these flights ended in a disastrous crash late last year, and this form of tourism, it is hoped, will end.)

For the past two Antarctic summers a second motorship has entered the scene, the *World Discoverer*. Capable of carrying some 200 passengers and crew, in great comfort, it is outfitted to travel into Antarctic seas, anchor, and perform landings at points of interest. Along with the *Lindblad Explorer*, it has opened the coastal regions of this remote continent to the eyes of those with a special taste for adventure. This seemed to be the kind of voyage that would fit into the Field Museum's tour program for its members. It offered a real adventure as well as an opportunity to see natural history in a part of the world that is virtually unspoiled.

Traveling with the ship are a group of lecturers, expert in various areas of natural history. Dr. George Llano was chief scientist for the Office of Polar Programs of the National Science Foundation for 25 years. During that time he visited Antarctica and the Antarctic Islands on numerous occasions and was involved administratively with most of the scientific research programs that continue there today. Commander

In Stanley, capital of Falkland Islands, travelers may rest and refresh themselves at the Upland Goose Hotel and Pub. Bright lupins embellish every yard

Angus Erskine (Royal Navy, retired) spent years in Antarctic regions as well as the arctic. He was attached to the British Antarctic Survey and did some of the first accurate mapping in the Antarctic Peninsula. Erskine is an expert on the history and techniques of Antarctic exploration. Mr. Frank Todd is an authority on penguins and other birds of Antarctica, and has a good deal of general expertise on seals, whales, and the other wildlife forms found there. Mr. John Green, for over twenty years with the British Antarctic Survey, knows the waters, harbors, weather, and sea signs of the region; he is in charge of logistics. Finally, for the January tour this year, I covered the geology of Antarctica, how it evolved, and how it is related to adjacent continents.

On board the *World Discoverer* is a lecture room that can accommodate all the passengers,

and there we five lecturers offered illustrated talks that provided the passengers with backgrounds for better understanding the features they were seeing, day by day, first hand.

A group of 15 Field Museum members, in addition to myself, departed from Chicago on January 6, flying to Santiago, Chile, where we joined groups from other parts of the world—139 travelers in all. Then on January 9 we all flew south to the Straits of Magellan region to the small Chilean city of Punta Arenas. There we met the *World Discoverer,* which was taking on fuel, water, and supplies. The next morning we departed eastward down the Magellan Straits—the seas calm, the day overcast. Every now and then we saw an oil-drilling platform in the distance. The land on either side of the Straits was low, broken only by occasional smooth hills.

The next morning we were out at sea, and by late afternoon New Island, one of the westernmost of the Falkland Islands, came into view. The ship anchored and we made the first of 16 landings that occurred during the whole voyage. The ship carried a group of rubber rafts, called *zodiacs,* driven by outboard motors and capable of carrying up to a dozen passengers each.

Ashore we hiked about a mile to a rookery of rockhopper penguins—handsome little birds with jaunty yellow markings over their eyes. They go from rock to rock, hopping like kangaroos. There was a large group of young birds in the rookery, and the adults were in constant movement—down to the shore, where they would go into the sea to eat fish, and back again to the rookery, each parent seeking out its own young and feeding them by regurgitation. Altogether

Gravestone of intrepid Antarctic explorer Sir Ernest Shackleton, who died here on South Georgia Island at age 47.

On New Island, Falkland Islands, black-browed albatross poses with chick in neatly sculptured nest of hardened mud.

there were about a thousand birds in the rookery, and mixed among these sober little rockhoppers were a few macaroni penguins as well as nesting black-browed albatrosses with young in their nests. All these birds are so unused to people that one could almost touch them.

The next day another landing was made on West Point Island (West Falklands), also populated by rockhoppers. The Falklands are islands of moderate hills that are grass-covered and completely treeless. They are treeless not because of overcutting by man, as in Scotland, Norway, and Iceland; the Falklands never did have trees. The small population of the islands (about 2,000) raises sheep; they heat their houses with peat. Another day of sailing and we were on the far eastern side of the Falklands, visiting the capital city of Stanley.

Geologically, the Falklands are a part of the South American continent—above-water projections at the eastern edge of the South American continental shelf. Politically, however, the Falklands are a little bit of England, and about 97 percent of the inhabitants are of British extraction. Every house in Stanley has a little garden of lupins and rose bushes, all carefully tended like those fine gardens you see in Britain. The people have accents rather like New Zealanders, are ruddy-faced, drive on the "wrong side" of the street, and one frequently sees small posters in the windows of homes that say "Keep the Falklands British."

For decades Argentina has claimed these islands, and Britain has resisted those claims. At present it's a standoff; however, if the stakes get higher—oil drilling and fishing rights on the continental shelf—the controversy could get hotter.

Stanley is a delightful town. The inhabitants were sincerely friendly, and a number of the *World Discoverer* passengers were invited to step into private homes to "have a nice cup of tea." The woolens cooperative store opened just for us, in spite of it being Sunday. The woolens are well made and inexpensive—a rarity in these times.

The following two days were spent at sea, part of the time in fog. The ship was to trace down to the Antarctic Peninsula part of the Scotia Arc, a series of islands and island groups that are projections of the Andes Mountains above sea level. At the tip of South America the mountains don't stop. Instead, they swing eastward to the far south Atlantic, then curve back westward to meet the mountainous Antarctic Peninsula, itself a further continuation of them into the heart of the Antarctic continent. The islands (peaks) of the Scotia Arc are, principally, South Georgia, the South Sandwich Islands, the South Orkneys, and the South Shetlands. We visited all but the South Sandwich Islands, which lie far east of our route and have no harbors.

On Wednesday, January 16, we entered Cumberland Bay on South Georgia Island. It was a sunny day, with small, bright, white cumulus clouds. The scenery was unbelievable. Picture the Alps sitting in the sea! From sea level, snow-covered, jagged alpine peaks rose almost 10,000 feet straight up! Icebergs floated in the bay, and broad glaciers streamed down to the shores. It was overwhelming.

We landed at Grytviken, an abandoned whaling station that is now in semi-ruins. When Captain Cook made his voyages of exploration in the 18th century he wrote, in his journals, of the wealth of seals and whales he saw in Antarctic waters. That was a mistake. In the 200 years that followed, British, American, and Argentine companies set up stations on many of the Antarctic island groups, using them as bases for uncontrolled slaughter. The southern fur seals were almost wiped out. Most all of the great whales were reduced to a point where they are now near extinction. Although these island stations have ceased to be commercially viable, the slaughter continues. Today the Russians and Japanese maintain large whaling fleets in these regions, though, for the want of whales, they too may prove to be uneconomic.

Author and tour leader Edward Olsen atop cinder cone on the volcanic caldera, Deception Island, part of South Shetland Islands.

We landed at this place, explored the ghost town, rambled over the foothills among the idyllic scenery, and dodged huge elephant seals on the beaches—wallowing in mud and bellowing at us as we passed. At one end of the ghost town is the graveyard. Here the gravestones are mostly Norwegian, for, in the past centuries, no matter what the nationality of a whaling company—British, American, or Argentine—the world's cadre of experienced whalers came from Norway. Among the graves of Johanssens, Erikssens, Olssens, and Jenssens are occasional English names—and one that reads Ernest Shackleton, Antarctic explorer, who, making one more voyage of polar exploration, died at this place in 1922.

For the rest of the day we coasted South Georgia, passing sparkling peaks, streamlined glaciers, black precipitous cliffs, and deep fjords. The next morning we went ashore at another harbor, the Bay of Isles. Amidst the rugged scenery was another sight that was difficult to believe. In one view we could take in a hillside covered with half a million king penguins! These are the second largest penguin species, up to three feet tall, with a beautiful yellow wedge of color at the side of the head. The beach, just below the rookery, was occupied by elephant seals as well as by a few fur seals.

Along one side of the rookery an enormous glacier came down to the sea, and from it poured a deep roaring river of numbing cold meltwater, milky white in color from all the finely pulverized rock dust it carried—a characteristic of glacial

Sugartop rises more than 9,000 feet on South Georgia Island. Snowfields and small glaciers lie below. The strata are sedimentary rocks.

melts all over the world.

Across from the penguin rookery we visited an island that was the nesting place of wandering albatrosses. These are the giant wanderers of the southern oceans, with wingspreads up to twelve feet. Like the penguins, these nesting birds showed no fear and seemed to take little notice of us.

After departing South Georgia we headed southwestward towards the South Orkney Islands. At sea we had marvelous luck to see one of the remaining southern right whales that has survived the slaughter—so far. He was a big one. He repeatedly dove and surfaced, one time almost clearing the water in a leap. It was a fantastic way to leave the vicinity of South Georgia—one of the most beautiful places in the world. Had the weather been stormy and overcast we would probably have thought it a grim place, never seeing the mountains, glaciers, or fjords.

The South Orkneys were seen under just such weather—gray, with periods of fog—much more the way high-latitude regions usually look. The mountains could not be seen to full advantage, and glaciers appeared gray and mysterious rather than brilliantly white and sparkling. We made only one landing, at Coronation Island, to see a

Group of king penguins enjoy the morning sun at Grytviken, abandoned whaling station on South Georgia Island. M.S. World Discoverer in background.

small rookery of Adélie penguins, then sailed westward to the South Shetlands, passing into seas more and more filled with icebergs. They were generally flat, but occasionally bizarre shapes were seen, riddled with caves that were a scintillating, almost electric blue. Now and then a cluster of penguins could be seen taking a ride northward by iceberg.

On January 22 we made a landing on King George Island, one of the South Shetlands. On this island the Polish government maintains a modern, well equipped research station, making studies in marine biology and geophysics. We visited a rookery that was populated by three penguin species: Adélie, chinstrap, and gentoo. We then plowed on to the Antarctic Peninsula to take full advantage of a high pressure weather system that promised clear weather.

Two of our staff lecturers, Cmdr. Erskine and John Green, had, during their professional careers, worked for many years in this region. They both agreed they had never seen such remarkably calm, clear weather for such a long period of time in this part of the world. For three days, under brilliant skies and gentle breezes, we explored the Antarctic Peninsula, its islands, and channels amid the most glorious scenery yet seen: mountains that ranged up to 11,000 feet, glaciers with streamlined, smooth, sinuous curves that swung between the peaks down the valleys to the sea, towering vertical cliffs, deep fjords, and icebergs in bright whites, electric blues, and pale greens, packed in so close that the ship had to edge slowly through them, cautiously pushing them aside. Some bergs carried groups of penguins; some carried single crabeater seals, with lustrous silvery coats and enormous brown, soulful eyes. They would stare at us and roll over or, in fright, lunge into the water.

We made a series of stops at rookeries and at research stations of the United States (Palmer Station), and Argentina (Almirante Brown). We visited Deception Island, an enormous volcanic caldera that last erupted in 1976. It was utterly barren, with steaming waters in several places. Cmdr. Erskine declared he had never seen the sun shine on Deception Island—but that day it shone brilliantly.

This part of the trip was the most memorable, and yet we were still to enjoy a "dessert": After two days crossing the Drake Strait northward—under unusually gentle seas for that part of the world—we saw Cape Horn and, next day, entered still more superb scenery—we cruised the Beagle Channel, again in beautiful weather. This is the channel that Charles Darwin traversed when he made his famous voyage on the *Beagle*. We sailed northwestward along the channel, passing a series of spectacular views—a succession of glaciers and high mountains, whose lower flanks were covered with a kind of low false-beech forest. Sweet smells of vegetation, so long absent from the air, came to us on breezes from the shores. Now and then a streaming waterfall was passed and, in one place, we could see nine falls in a single view.

Viewed from deck of M.S. World Discoverer, *mountain peak juts dramatically from the placid Antarctic waters.*

Finally we turned northeastward to Punta Arenas, and the nervous clutter of civilization again.

Although we visited penguin and albatross rookeries during this voyage, and saw many seals ashore, this was not all the wildlife. At sea we saw a constant stream of birds. Some of these, like the giant petrels and snowy petrels, would follow us for days at a time—swooping over the stern of the ship. Most others stayed for awhile, usually near land, and passed on: wandering albatrosses, skuas, terns, shearwaters, fulmars, cormorants, ducks, geese, herons. Besides sighting the southern right whale, we also sighted Minke whales, and dolphins at sea. It was a constant stream of wildlife of this part of the world.

Though most of our participants were experienced world travellers, this successful journey was counted unique by everyone. Some will return in a future year to repeat the experience. There are few places left on this planet where one can feel a real sense of primitive earth. Standing on a hilltop on the Antarctic Peninsula, viewing an expanse of jagged mountains, glaciers, and sparkling sea below, in utter silence—broken now and then by the low rumble of a distant avalanche—is an experience that is profound. It will not be forgotten by any of us.

OUR ENVIRONMENT

Poison Ivy Rash Control?

The effect of poisonous plants on man may be brought under control if compounds developed by scientists at the University of Mississippi prove as effective on human beings as they have on guinea pigs.

Researchers have developed derivatives of urushiol—those compounds found in poison ivy, poison oak, and poison sumac—that cause allergic skin reactions.

In one strategem, urushiol is hooked onto the membranes of red blood cells to form a molecule large enough to trigger the body's immune system to react against the intruder. In another, simple compounds are injected into the body, where they spontaneously form internal urushiol derivatives; these, in turn, produce profound tolerance to the urushiols of the poisonous plants.

Acid Dust

You've heard of acid rain—how about acid dust? That is how sulfur oxides and nitrogen oxides come down in Los Angeles, where rain is irregular. Two scientists at the California Institute of Technology collected dust on flat plates covered with a sticky substance and exposed to Los Angeles air. They found that twenty times more acidity reached the ground as solid particles than as rain. They also discovered that the concentrated acidity of smog particles could burn holes in a leaf's surface. And, unlike rain, acid dust flows into buildings, where it can damage plastic and rubber.

New Protection for Pandas

The People's Republic of China has disclosed a plan to save pandas from extinction by making protected zones of their habitats and planting more food for them.

The Communist Party newspaper *People's Daily* said authorities in northern Sichaun Province, where pandas live, have designated 13 protective zones.

No hunting will be allowed in such areas and no trees can be cut in an effort to preserve bamboo, the panda's principal food.

Carbon Dioxide Absorption by Temperate Zone Forests

The world's temperate zone forests are doing a better job of absorbing carbon wastes from fossil fuel burning than some scientists give them credit for. That's the conclusion of studies done by a Duke University researcher and a colleague in Indiana.

Over the last 30 years, says Charles Ralston, professor of forest soils at Duke, there are indications the temperate forests may have been accumulating up to 1.2 billion tons of carbon a year. "This is about 20 percent of the annual carbon release from combustion of fossil fuels over the period," says Ralston. This is strong evidence, he believes, that the temperate zone forests "have been partially dampening the increase in atmospheric carbon dioxide" from fossil fuels, as well as tropical forest clearance and burning.

Ralston and Thomas V. Armentano, of the Institute of Ecology, in Indianapolis, noted in a recent paper that the role of temperate zone forests in carbon recycling hasn't been fully explored. They say that analysis, however, points to underestimation of the growth rates and size changes of the forests. Thus, they say, the temperate zone forests are accumulating more waste carbon than some scientists had thought. Ralston says some ecologists have claimed that clearing of forests, mainly in the tropics, is responsible for carbon dioxide release of "great magnitude."

He and Armentano decided to look into such assertions because carbon releases claimed for tropical forests haven't raised atmospheric carbon dioxide above levels expected from burning of fossil fuels. Ralston says net forest growth is actually occurring throughout the temperate zone. The principal carbon "sinks" formed by temperate zone forests are in North America and Siberia. Limited data show that Siberia has a large stock of slowly growing conifers that are underexploited —torming a sink equivalent to that of North America.

Western Europe's forests, he says, have expanded by 7 percent since World War II, and similar recovery may be occurring in temperate Asia.

Trees and other plants absorb carbon dioxide during photosynthesis. Researchers in the United States and other industrialized nations are becoming worried that too much carbon dioxide from fossil fuel combustion will affect global weather through a "greenhouse effect" that traps solar heat. This could result in a rise of the global temperature and cause partial melting of the polar ice caps, some scientists think.

Other researchers, mainly botanists, fear higher carbon dioxide levels will adversely affect the growth characteristics of commercially valuable plants such as cotton. The worldwide carbon dioxide level is about 330 parts per million. It has been rising since the onset of the industrial revolution in the 18th century. If the rise continues at the present rate, some studies suggest that atmospheric carbon dioxide will double in about 30 years.

Ralston says current forest management trends indicate net forest growth will continue through the rest of this century. Many of the trees in the temperate forests were cut over the last 200 years in North America.

Improved management, says Ralston, has turned the situation around, and there has been a net growth in the United States for the past 25 years. Even so, he adds, forest growth in this country is only half what it could be with more widespread forest management techniques. Not only would there be more wood available, but the expanded forests would serve to accumulate even more waste carbon from power plants and other sources.

The Demise of Bald Eagle PR-1727

The file on bald eagle number PR-1727 is trim by government report standards. Three uncrowded pages of numbers and a few words summarize the death of eagle number PR-1727. The dead eagle was found by citizen Wendell Adams on May 12, 1979, near Togo, Minnesota. Citizen Adams turned the carcass over to Ken Schlueter, a Minnesota state conservation officer. The routine that follows is methodical, precise.

Officer Schlueter confers with David Duncan, special agent with the U.S. Fish and Wildlife Service (FWS) in Duluth. Agent Duncan initiates action to determine the cause of death. It will take time but there will be an answer from technical people in the FWS laboratories.

He sends the carcass to the National Wildlife Health Laboratory in Madison, Wisconsin, for necropsy to determine if the eagle died of disease or injury. Louis Locke files a necropsy report and leaves the diagnosis open. Tissues from bald eagle PR-1727 are sent to the Patuxent Wildlife Research Center in Laurel, Maryland, for chemical analysis. The one-page report from Patuxent shows a list of chemical compounds with decimals in parts per million listed alongside each compound. These are the small amounts of each chemical found in the dead eagle.

The complete report is sent to Agent Duncan. A copy goes to the Service's Regional Office in Minneapolis, where James Elder, a specialist who deals with environmental contaminants attaches a note to the tidy file. His comments are brief, but disturbing:

Continued on p. 19

The Jeanetta and Karl Menninger Collection of Indian Rugs

By David M. Walsten
Color Photography by Ron Testa

THOUGH UNMARKED BY CEREMONY, December 21, 1979, was a very special date at Field Museum. For it was then that 15 superb specimens of Navajo textile art were accessioned by the Department of Anthropology. The 15 rugs and blankets represented the first gift of a total of some 75 in the collection built by Dr. Karl A. Menninger and Mrs. Menninger, of Topeka, Kansas.

The Menninger Collection is the result of several decades of discriminating selection by the world famed psychiatrist and his wife, who have had a life-long interest in the art and culture of the Native Americans of our Southwest.

Most of the specimens already to be found in the Museum's collection of Navajo textile art (about 100 in all) were acquired shortly after the Museum's founding; these materials, then, are largely of the nineteenth century.

The Menninger Collection, on the other hand, is particularly strong in twentieth-century weavings, effectively documenting transitions in style, design, weaving technique, and color from the turn of the century up to the present. Thus, in a most significant way, the Menninger specimens complement the earlier holdings.

The Field Museum is permanently indebted to Dr. and Mrs. Menninger for their gracious and generous gift. It further reinforces the Field Museum's position as one of the world's great repositories of Native American Art. In due course, the Jeanetta and Karl Menninger Collection of Indian Rugs will be placed on exhibit at the Museum for its Members as well as the general public to enjoy.

Several of the specimens already received are shown on the following pages.

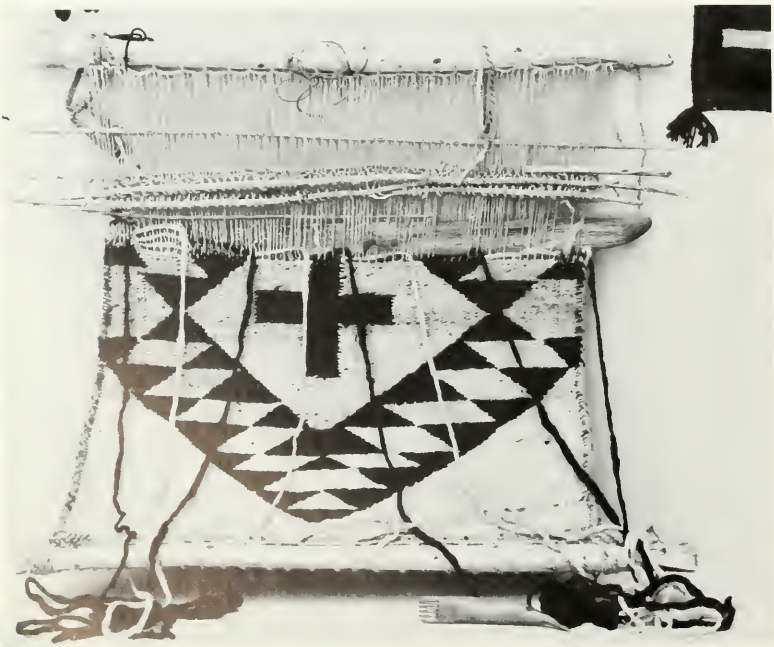
Dr. and Mrs. Karl Menninger examine one of the Navajo blankets in their collection.

Wide Ruins; 64"x87" (163x221cm). This large rug is representative of the "Revival" style, apparently started by the National Association on Indian Affairs in Boston in 1920. Association members undertook to revive the high standards of the old Indian blankets, and sent photos and drawings of fine old Indian rugs to traders and schools. They also solved problems in dye use and demonstrated these to the Indians. But the new-old style put fresh life into the rug business, and today these muted, striped, natural-color rugs are in popular demand.

Above: *Ganado; 44"x69" (112x175cm). A recent rug, with good dyes and excellent diamond design with serrated outlines. Such outlining requires great weaving skill.*

Below: *Navajo Pictorial, Yeibechei; 58½"x91" (149x231cm). Yeibechei rugs depict Navajo divinities as seen in the masked dancers of the sacred dances. They are rather similar to the Hopi kachinas. It was taboo to depict them except in the sacred sand paintings, which were made for healing ceremonies and always destroyed afterward. When this taboo was broken by a weaver depicting such divinities on a rug, the weaver was believed to be cursed forever. The taboo and the fear have now greatly subsided, and many Yeibechei rugs are today woven to sell.*

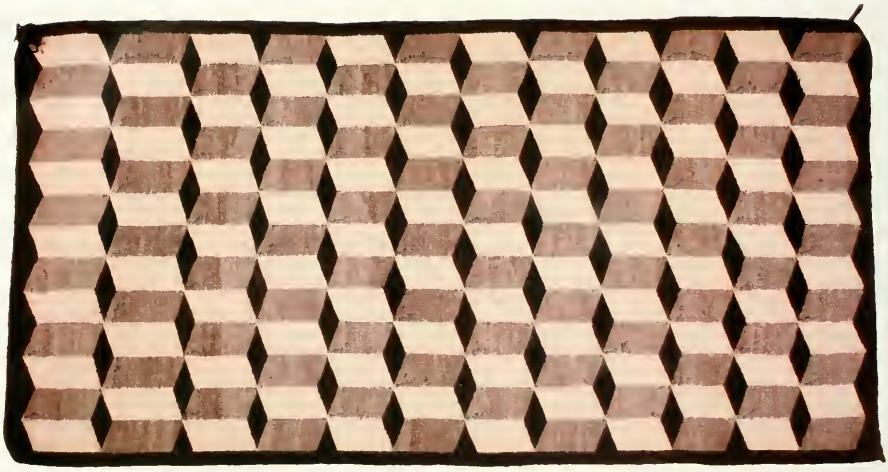
The specimen shown here is exceptional for its great size and the number of yei (10)—elongated, stylized figures. The rainbow god, on the right, extends around three sides of the rug. Each figure wears the traditional square, woman's mask (the men's are oval), and their legs are shown, indicating that the figures are dancing. They carry long sprays of spruce.



Above: *Turn-of-the-century photo of Navajo weaver outside her hogan.*

Left: *Navajo loom with partially completed blanket in Field Museum collection.*

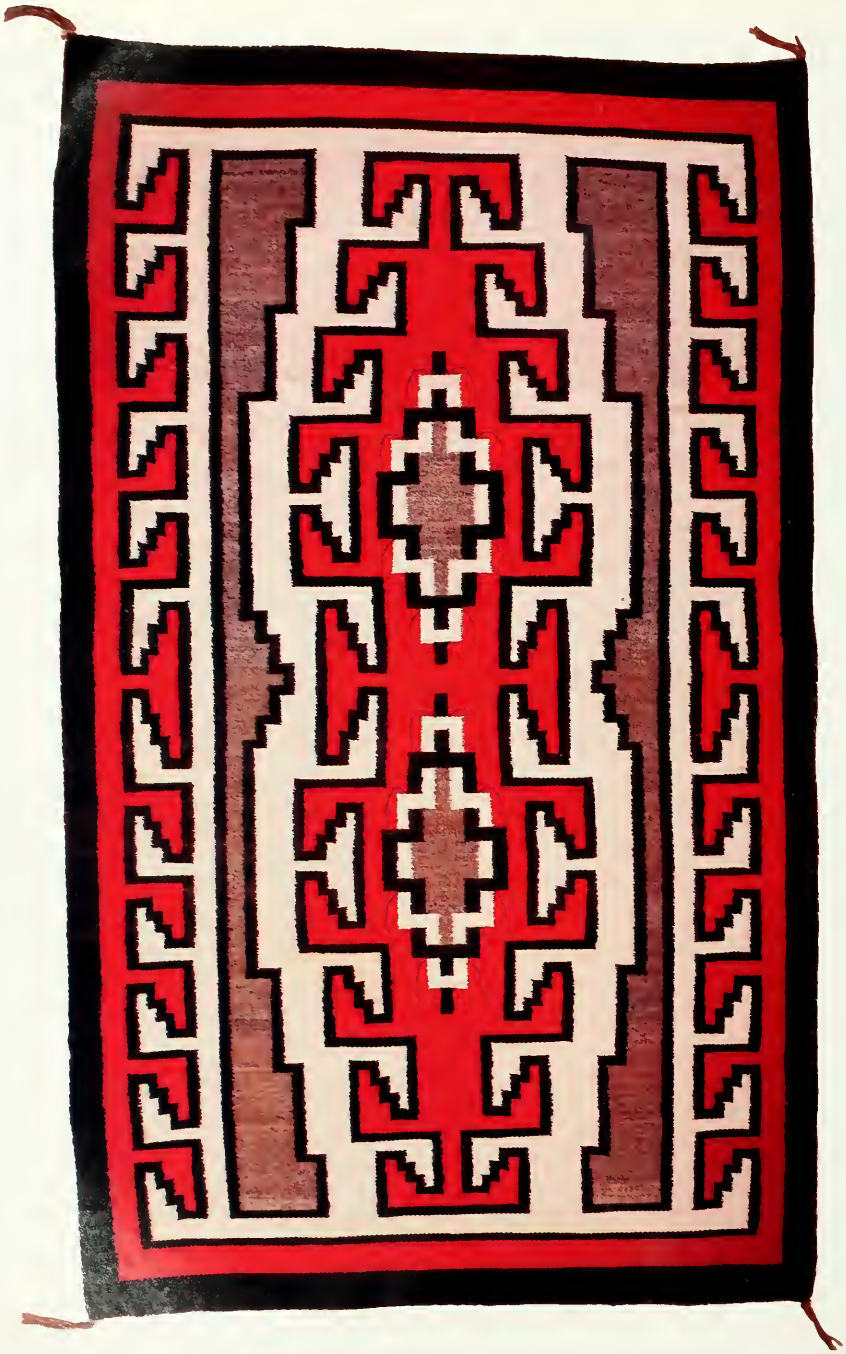
Teec Nos Pos; 74"x84" (188x213cm). "Eye-Dazzler." So-named for the design and vivid colors. Teec Nos Pos *is Navajo for "circle of cottonwoods." The design of these pieces often includes zigzags, lightning and rhythmic movement that may have a rather eerie effect. A Navajo legend tells of a Teec Nos Pos weaver who was so frightened by his own rug when the sun shone on it, that he took it to the trader and asked him to hide it.*



Above: *Two Gray Hills; 35"x70" (89x178cm). Two Gray Hills is a community about 50 miles from Shiprock, in the New Mexico side of the Navajo reservation. It has long had a reputation for the finest modern Navajo weaving, although at present many other weavers and regions compete with them successfully. The reputation is traced to the influence of J.B. Moore, who had a store at Crystal, New Mexico, until 1912. He supervised the cleaning of the wool and chose the best weavers to make rugs after his own patterns. This type originally had no dyed colors, only white, black, and a combination of the two in gray, which was an innovation. The above example is a finely woven modern rug showing an unusual departure from the conventional style. In this optical illusion design the elements shift back and forth, depending on how it is viewed.*

Below: *Two Gray Hills; 54"x77" (137x196cm). Some mild tan color is used in this example, but the involved, rather solemn pattern and elaborate border, and the perfection of the weaving are characteristic. This rug has the so-called spirit line, an aristocratic touch. Note how skillfully the weaver carries the border around the corners.*

Ganado; *48"x78" (122x198cm). Ganado is an Indian community known for its Indian school and for its hospital established by the Presbyterian Church but now belonging to the Navajo tribe. Ganado is also known for its relation to Lorenzo Hubbell who, as an early trader living among the Indians, worked to maintain and develop high standards among the weavers and to get orders and good prices for their work. He and the Fred Harvey Company were strong and constructive influences upon the weavers. The Navajo weavers had been exploited and without market guidance, and were carried away with the new aniline dyes which reached the tribe about 1880. Harvey contracted with Hubbell to take his entire intake of good quality rugs at premium prices for high standards of weave, wool, colors, and designs. The rugs were often made to order in very large sizes for wealthy customers. They required many months to complete on the Indian looms which had been intended for weaving blankets, not large, heavy rugs. Navajo women have always woven in one piece, never in separate strips sewn together as was done in Mexico and many other countries.*



Above: *Ganado; 51"x85" (130x216cm). A later rug with good dyes and an excellent design of diamonds with serrated outlines, which were, and remain today, quite popular. The outlining technique requires great weaving skill.*

Continued from p. 10

"Dieldrin has been outlawed for from five to eight years, depending on location, but it's still showing up in the environment and clobbering eagles."

The Patuxent analysis disclosed a concentration of 5.1 parts per million of dieldrin in the brain of the dead eagle. Former laboratory studies revealed that the lower end of the curve for death due to poisoning is at about five parts per million in the brain. Bald eagle PR-1727 may have died from the concentration of dieldrin, Patuxent researchers say.

Dieldren is a highly toxic organochlorine insecticide in the class with DDT, heptachlor epoxide, chlordane isomers, mirex, toxaphene and hexachlorobenzene, Elder explained.

Even though dieldrin has been banned from most use, evidence indicates the insecticide is apparently present in the environment of the Great Lakes. Fish-eating birds are especially vulnerable to dieldrin because it accumulates in the aquatic food chain. Thus, eagles that feed on fish can be affected. The demise of bald eagle PR-1727 is a reminder of earlier mistakes made with toxic insecticides. When asked how long dieldrin might hang on in the environment, Elder answered, "No one really knows."

The Beleaguered Desert Bighorn

Lanny Wilson has a philosophy he thinks may help save the beleaguered desert bighorn sheep. "Think like a sheep," he advises. "You've got to put yourself in the old sheep's place."

Wilson, a sheep biologist with the U.S. Bureau of Land Management in Idaho, makes this recommendation after years of experience with bighorn research and transplant efforts. Because transplant efforts are so new, no one can say whether any have really been successful. Wilson is "scared to death" for the future of the sheep. "I think we could damn near lose them in the next 100 years."

In 1974, the total U.S. desert bighorn population numbered 13,000-14,000. Some states have since reported updated figures that indicate more sheep than originally thought, mainly from improved survey techniques and wet years that allowed good vegetation growth for foraging sheep. Despite these optimistic indicators, Wilson and others see the road to salvation for these high-strung, handsome animals strung with complexities, aggravated by the same factors facing biologists and sportspeople during their frustrating, often futile attempts to save a small corner of the country for wildlife.

On a western map, the desert bighorn's distribution is spotty. This unique aspect, which Wilson terms the "island concept," arises from a drastic reduction in *Ovis canadensis nelsoni's* historic range. Roads, dams, off-road-vehicles, subdivisions, mining, fences, wild horses and burros, and livestock, plus overhunting and disease, have edged the bighorn to this discouraging point, where the only hope may be the success of delicate transplant activities and curtailment of the human encroachment contributing to their demise.

In Nevada, New Mexico, Arizona, Utah, and California, the story is the same. Early explorers, mainly Spaniards searching for the Seven Cities of Cibola, wrote in their journals of great numbers of bighorn sheep living in the rugged canyon country, providing juicy meat for hungry travelers. In Texas, where introductions are underway to restore extirpated populations, bighorn meat fed railroad workers and miners, and was also shipped East. Settlers and more "progess" ate into their habitat. Now, remnant herds cling to tenuous existence on the isolated, precipitous terrain they must have to survive.

Bighorn need space. Although the other three essential habitat requirements —food, water, cover—must be present, space can't be forgotten, Wilson warns. Sheep thrive on grass, cactus pulp, and paloverde beans. They also need escape terrain within easy leap where, using their keen eyesight, they are afforded unobstructed views of their surroundings, as well as adjoining flat land for lambing. While they have adapted to withstand long dry periods, at some point water becomes a limiting factor. But space, says Wilson, is probably the "most important and least understood habitat requirement" of wild sheep.

With few exceptions, bighorn simply do not tolerate competition. They will abandon otherwise suitable areas after cattle, goats, feral horses or burros, or other ungulates enter. National Park Service officials in the Grand Canyon and Death Valley are currently struggling to decide how to eliminate the threat wild horses and burros pose for bighorn. Wilson reports that during his research in Utah, a sheep herd reoccupied an area as soon as domestic cattle were removed. While other animals are of serious concern, say biologists, human intruders unquestionably exert the strongest negative pressure on bighorn.

As Bill Montoya of the New Mexico Department of Game and Fish puts it: "You can't grow sheep in a housing development." To give sheep the isolation they need, a sizable buffer must be provided. Introduce a road into sheep range and "you might as well write off that herd," Montoya says. Off-road-vehicles, roaring through prime bighorn territory, may also force the wary animals to forsake their homes. If 20 sheep are crowded onto an area with a carrying capacity of only 10, the population will certainly drop, Montoya points out.

Even less active re[illegible] pursuits must be regulated. Camper[illegible]rs can disturb the bighorn, unu[illegible] to human activities. All these [illegible] create barriers to migration tha[illegible] further isolation of the bighorn. Alt[illegible] he lacks documentation (and consequently, the support of other biologists), Wilson has a hunch that this isolation precipitates inbreeding and possibly less healthy populations. Rams move great distances to reach ewes, and if their movements are hindered by a highway or a new lake, the gene pools of separate herds cannot mix, suggesting to Wilson that inbreeding "might have been an important factor in the extinction of some historically-isolated populations." Other genetic factors he thinks deserve more research are reproduction, harvesting of less cautious animals, and susceptibility to disease and parasites.

Bighorn research needs are many. In Arizona, utility-funded research is being done on effects of a local electrical transmission line on bighorn. Five-hundred-kilovolt lines under construction from a nuclear power plant near Phoenix will dissect some of the best range for the state's estimated 3,000 bighorn. Robert Weaver of the Arizona Game and Fish Department explains that the study is giving good information on "things we only had an inkling of before." The transmission line itself is not of as much concern as the increased vehicular access it will permit. He believes the sheep probably could adapt to the lines, but increased human presence at certain times of the year, particularly during lambing and rutting seasons, is beyond their powers of adjustment.

Weaver hopes two relocation efforts on the drawing board will take. This fall, young sheep captured from the Black Mountains west of Kingman will be enclosed on public land in northwestern Arizona's Virgin Mountains. Similar releases are underway or planned in Utah, Nevada, and New Mexico.

Bighorn reintroductions generally follow a standard procedure. Once habitat is located and rated for suitability, an area is enclosed to hold new sheep. In this paddock, young sheep can acclimate to unfamiliar surroundings. They have just been loaded off a dark truck after being "shot" with "cocktails" to immobilize and tranquilize them, relieving stress from contact and commotion.

Two- or three-year-old sheep from the same herd are ideal transplant candidates, because they can better adjust to new surroundings, says Wilson. This is the time to remember his adage "Think like a sheep." They are looking for someone to talk to," he says, and are going to stay together if they know each other. These younger animals have not yet had a home range thoroughly imprinted on them through the learning process passed from older to younger animals.

LEARNING MUSEUM CONTINUES WITH:

THROUGH CHINESE EYES

By ANTHONY PFEIFFER
Project Coordinator

Made possible by a grant from the National Endowment for the Humanities, a federal agency.

Jesuit missionaries were shocked and the faiths of some were severely shaken by what they encountered in sixteenth-century China. The news they sent back to the West caused a furor among the educated public. Highly complex and sophisticated systems of philosophy and religion were not supposed to exist outside the western world. Today, although the news is four centuries old, a fascination for uniquely Chinese perspectives remains.

The aphorisms of Confucius, the *I-Ch'ing*, the practice of holistic medicine and acupuncture, and the concept of enlightenment are a few aspects of Chinese world view that command attention today. These belief systems express a blend of mysticism and practicality. They combine sensitivity, vision, discipline, and strength in a way that many Americans find either strange or curiously compelling. Images of inscrutable Orientals, virtually superhuman martial artists, or wise old men with stringy beards who say much with few words are all manifestations of western intrigue with the mind and style of China.

Representation of Chinese religious drama, showing Ten Courts of Purgatory. On view in Hall 32.

Through Chinese Eyes, the fourth in Field Museum's NEH Learning Museum Courses of

Study series, offers the opportunity to explore Chinese concepts of belief and behavior. It features ways of perceiving and reacting to life's ups and downs that are very different from our own.

We naturally impose our own categories of experience on something unusual. Confucianism, for example, is generally listed as a religion in most texts. For more than 2,000 years, however, Confucian teaching was not a religion, but a set of universally accepted rules regulating society. Many of us merely associate Confucius with short, punchy sayings such as, "Real knowledge is to know the extent of one's ignorance." (Analects, II, 17.) Confucianism was a moral and ethical system shaped in the fifth and fourth centuries B.C., formalized in the first two centuries A.D., reworked by twelfth-century philosophers, and still vigorous in the late eighteenth century—an astonishing record.

According to Confucius, the center of human existence is the family—by which he meant a number of generations living together. Confucius asked, "Are not filial devotion and respect for the elders in the family the very foundation of human-heartedness?" Veneration for the family pervaded daily life in traditional China and even extended to the spirits of dead ancestors who were invited to all family occasions. So strong was the sense of family that an unruly child could be legally put to death. One nineteenth-century Chinese picture, for example, shows members of a family drowning an "unfilial" son in a well.

This seeming harshness and the dedication to family virtues made sense in an agricultural society. It took much manpower to work the fields. The collapse of a family not only violated tradition and belief; it could mean the loss of a labor force and starvation. A sense of family, then, was not only a spiritual matter; it was a way of survival.

In different ways, Taoists and Buddhists denied the importance of the Confucian concept of family. Taoism spoke of a god within the person, of looking within to find this god, and of cherishing the body because it contains the god. Buddhism teaches that the body ties one down to this world and that one should transcend the body for a higher plane of existence. Both religions were individual or otherwordly rather than social. Conflicts between the various schools of thought were often more theoretical than real. Priests might do battle and enlist others to the fray, but, at the village level, Confucian family life went on as it had for thousands of years.

Portrait of Confucius, ca. 1734, from Confucian temple of Hsi-an, Shensi province.

Through Chinese Eyes is not simply a matter of looking at conflicting "isms"—whether Confucianism, Taoism, Buddhism, or others not yet mentioned such as Legalism, Neo-Confucianism, or Maoism. Concepts representative of each of these schools of thought were graphically expressed in arts and crafts. Buddhists were concerned with nirvana, or enlightenment—a mystical state of consciousness in which one achieves unity with the universe. Artists reflected this con-

NEH Learning Museum at Field Museum

The NEH Learning Museum program is a three-year sequence of learning opportunities focused on the Museum's outstanding exhibits and collections and designed to give participants an opportunity to explore a subject in depth. Each unit of study consists of one or more special events, a lecture course, and a seminar for advanced work. Special events are lectures by renowned authorities or interpretive performances and demonstrations. Course members receive an annotated bibliography, a specially developed guide to pertinent museum exhibits, study notes for related special events, and access to select materials from Field Museum's excellent research library. In-depth, small group seminars allow more direct contact with faculty and Museum collections.

LEARNING MUSEUM

cern by portraying essences rather than strict appearances. Attention to detail was subservient to a sparse depiction of reality. Graceful lines might suggest the majesty of a mountain but the features of the mountain—its slopes, ridges, etc.—were just not shown. The Buddhists also drew with as few lines as possible, believing that to show something with rigorous aesthetic economy was part of understanding its essence. A drawing was meant to capture the true spirit or meaning of what was drawn and nothing more.

Statue of Goddess of Mercy, ca. 1736-95

To Buddhist philosophers daily experience was not parcelled out in discrete packages. Consider, for example, the experience of a student in the martial arts:

> *A young boy named Ming wanted to study martial arts with the master Ch'i. For many weeks Ch'i refused to have anything to do with Ming. But Ming persisted and, finally, Ch'i told him, "You may study with me but first go to work in my kitchen." Ming dutifully prepared the master's meals and kept the kitchen clean for eight months. He came to Ch'i and in frustration complained, "Master, I have worked in your home and still I know nothing about fighting." Ch'i responded by hitting Ming with a stick. From that day on, several times a day, Ch'i surprised Ming with powerful blows of his stick. Even while asleep Ming was not safe from his master's attacks. His body became a mass of welts and bruises. Months passed. Early one morning as Ming stirred soup in the kitchen, he sensed Ch'i moving toward him. Just as the blow was delivered to his head and without turning around, Ming raised the soup spoon and blocked the stick at the last second. Ming turned to face the master. Ch'i bowed curtly to him and said, "You are now a martial artist, leave my home."*
>
> —paraphrase of a Ch'an Buddhist tale

This form of apprenticeship, indeed the very process of teaching and learning, is foreign to us. Ch'i did not grade Ming and there was no clear cut moment when instruction began. Ming's graduation, such as it was, was abrupt and informal. Most Americans learning the martial arts have to pass tests of proficiency. Their ranks are signified by varied colored belts, with the black belt standing for highest accomplishment. All beginners wear white belts. In traditional China the white belt was also worn and, as the student progressed, working harder and harder, the belt got dirtier and dirtier, eventually turning black. The emphasis was not on distinct steps each leading closer to mastery, but rather on a learning process culminating in mastery. Chinese martial art was not taught, as it usually is in this country, as a way to fight. It was part of philosophical training and a way of life. The same kind of training was typical of learning to paint, to write, and to worship. It was essential to higher learning.

Traditional Chinese thinking can be bewil-

Details on THROUGH CHINESE EYES are available in the Summer Courses for Adults *brochure and the* July/August Calendar of Events. *All Chicago area members are on the mailing list for both publications.*

deringly holistic. Participants in *Through Chinese Eyes* encounter this philosophy again and again. The T'ang emperors (A.D. 618-907) were simultaneously sons of men, with ancient and superb pedigrees, and sons of heaven, descendants of the highest levels of the spirit world. Our religions distinguish sharply between this world and others. Another manifestation of Chinese concern with wholeness is seen in the contrast between Puritan expressions of guilt and sin and traditional ways of handling the same feelings in China. In Chinese philosophy there was no divided self. The sinner did not hear the accusing voice of God or have a conscience that was somehow separate from the rest of the psyche.

Through Chinese Eyes begins at Field Museum on June 19 with a six-week lecture course on Thursday evenings. Perspectives of philosophy, sociology, art history, and theology are interwoven by some of Chicago's finest scholars to give a rich view of Chinese traditions of behavior and belief. Explore some of the major aspects of Chinese thought and perception through a stimulating series of lecture, discussion, and film.

An all day CHINA FESTIVAL is scheduled on July 20. While learning about Chinese philosophy and religion, you can see and experience them as expressed in cultural activites. CHINA FESTIVAL presents a lively celebration of Chinese culture through the performing arts, films, calligraphy, workshops, demonstrations of martial art and fine art, traditional games for the whole family, and authentic cuisine. Admission to the entire day's activities is free with Museum admission. An in-depth seminar, open only to class participants, completes the Course of Study.

Eighth-century Taoist poet Li Po. Inscription reads, "A thousand days of intoxication won him glory for 10,000 years."

University of Chicago graduate student Carol Meyer, excavation site supervisor, views partly excavated storage vessels in the Roman villa. Photo by Don Whitcomb.

The Port of Quseir al-Qadim 1980

BY DONALD WHITCOMB AND JANET JOHNSON

The coast of the Red Sea was the setting for exciting changes and new discoveries during our second season of excavations this winter. Our first impression was not the hot and desolate ruins which we described in "Roman Bottle Caps" in the January, 1980, *Bulletin*. Last October, Egypt's Eastern Desert received very heavy rains and flooding occurred in many places, including the remains of the ancient Roman harbor at Quseir al-Qadim (our excavation site), which were covered with a fresh layer of silt. A more pleasant result of the rains was literally the blooming of the desert: On the site as well as in the mountains, the normal reds and browns of the desert were now relieved by spots of green in depressions and drainages.

Besides being an unexpected and almost miraculous pleasure to the eye, the sprouting of these desert plants was especially exciting for the palaeoethnobotanist on our expedition, whose collections of this natural, although rare, vegetation include wild flowers and even some little wild melons. These are especially useful for comparison with the seeds and plant remains recovered from the excavations, although the edible seeds most frequently found in both the Roman and Islamic occupations are standard foods and fodder such as wheat, barley, and even alfalfa. Other common Egyptian foods are present, such as dates, lentils, and chickpeas, along with more exotic plants, such as almonds, walnuts, grapes, and peppercorns. Normally such remains are only rarely preserved when accidentally burned; at Quseir al-Qadim most of the excavated areas have produced, with careful sieving, botanical remains that are not only abundant but almost modern in degree of preservation.

In a sense about half of our excavations are "modern" by archeological standards, for one of the two aspects we are studying is the Islamic port. These Islamic remains are located on low bluffs where it is difficult not to be distracted by the blue and turquoise of the sea, just beyond the trenches. "Trenches" is perhaps a misnomer for the large shallow excavations with wall foundations delimiting rooms and courtyards. As was true of the Islamic houses excavated during the 1978 season, these Islamic houses were easily and quickly uncovered. Some courtyards had almost a meter of organic debris, matting, basketry, and rope. Mixed with this material were ceramics which indicated a 15th- or 16th-century

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Donald Whitcomb is assistant curator of Middle Eastern archeology and ethnology. Janet Johnson (Mrs. Donald Whitcomb) is associate professor of Egyptology at the Oriental Institute, University of Chicago.

Above: *Section of the excavation site of the Islamic town at Quseir al-Qadim. Photo by Don Whitcomb.*

Right: *Textile fragment with batik design from the Quseir al-Qadim excavations. Photo by Steve Sidebotham, expedition photographer.*

date, including Chinese celadons and porcelains (with Near Eastern blue and white imitations) and even some Italian majolica sherds.

Beneath one wall we found a large painted wooden box with its lid still in place. With some excitement we opened the box to find a woman's personal treasure—a comb, lumps of henna (for her hair), a cloth bag of leaves (tea?), little parcels of other herbs, jewelry including cowry shells and a tiny metal talisman intended to protect the whole collection. We have found great numbers of glass beads and bangles, as well as jewelry. Whereas in 1978 we found a great variety of textiles, this season we uncovered articles of clothing from shoes, to tunics and caps. The textiles also included beautiful examples of batik decoration.

The rubbish left by this medieval population also included masses of bones (as well as seeds), especially fish bones and, more rarely, bones of goats and sea turtles, indicating a heavy dietary reliance on the sea. Our zoologist has encountered unexpected problems of preservation—there is occasionally too much meat left on the bones for easy identification! Problems of indentification of fish are partially remedied by the discovery of fish heads, tails,

Archeologists pose with Egyptians who assisted in excavation. Whitcomb is fifth from left, front row; Johnson is to his left. Photo by Cathy Valentour.

fins, and scales. Eventually a whole parrot fish and half a shark (nicknamed "Jaws") were excavated. The latter, naturally, was labelled on the site plan as a "creature feature."

As rich in architecture and artifacts as the Islamic remains at Quseir al-Qadim may be, they are only half of the excavations—the half east of the coastal road through the site. On the western side we have been investigating the Roman occupation, at which time the port was named Leukos Limen. We began where our excavations in 1978 uncovered a room with an iron-working furnace.

Across a narrow street, we excavated a large Roman house which we called the villa. Whatever the status of its Roman occupants, they (or, their house) are now definitely "below the salt." Nearly two thousand years of even infrequent rainfalls have turned the decayed mudbrick walls into solid *caliche*, or rock salt, from 20 cm. (8 in.) to over a meter (39.4 in.) thick. After breaking several pick handles and a steel pick, we borrowed a pneumatic drill from the phosphate company nearby. This experiment in mechanized excavation failed and we settled on sledge hammers and chisels. We often felt more like miners than archeologists.

Once the salt crust had been removed, however, the contents of the villa were a pleasant surprise. In 1978 we found many artifacts but only a few complete vessels. Suddenly this season we have a series of rooms filled with whole pots. For example, a corner room next to the narrow street held about 15 small round jars with tiny spouts, which probably contained a semi-precious liquid such as olive oil. These jars had rolled around the floor like so many marbles among other stored objects such as a small mill for grinding flour (complete with wooden handle), a large wooden bowl not unlike a modern salad bowl, and an assortment of wooden pulleys and mechanical parts. The most puzzling feature was below these objects—a complete intact roof with beams, wooden stringers, matting, and mud. This paradox of fallen objects heavy and fragile, mostly unbroken, was solved when we found a trap door leading to a cellar or crypt. With mounting excitement we slowly excavated into the cellar only to find it empty; when the Romans decided to leave Quseir they inconsiderately took all their hidden valuables; only a few coins were left behind.

Adjoining this small room was a larger storeroom filled with large amphorae and storage jars, all smashed but reconstructable. Also in this room were several large baskets and a large grinding stone from a Theban mill. This Roman villa was probably one of several residences of merchants grouped along the main street of the town. In the center of Quseir was a large public building which we also partially excavated. This structure consisted of large rooms grouped around a central courtyard. To our surprise we discovered the corner of an extremely well-built structure next to the central building during the last days of digging. Terra cotta figurines in the vicinity made us immediately think of temples, but the solution must wait for our next season of excavations.

As part of our research into the history and functioning of ancient Quseir, we intended to study the ruins at Bir Kareim. The wells at Bir Kareim, some 25 km (15.5 miles) southwest of Quseir, are the nearest reliable source of fresh water; also near these wells were gold mines which the Romans worked. Unfortunately the same rains which made the desert so beautiful also completely destroyed the roads into these mountains. Nevertheless, we visited Bir Kareim and briefly investigated the Roman mining encampment. In the center of the numerous barrackslike buildings was a temple, of which we made a careful plan. Our very hasty excavation into the central room revealed fragments of stone relief, part of the uraeus (sacred cobra) and sun disk which would have surmounted the shrine niche. It is, of course, a hallowed tradition in archeology for the most exciting find to be made on the last day; the temple at Bir Kareim, as well as the Roman and Islamic discoveries at Quseir, will only increase our impatience to return for future work on this coast of the Red Sea. □

June and July at Field Museum

(June 15 through July 15)

New Exhibit

"Gold of El Dorado: The Heritage of Colombia." Don't miss this extraordinary exhibition of gold artifacts and ceramic pieces from Colombia, South America. Jewelry, musical instruments, hunting and fishing gear, and cooking utensils—all crafted from the valuable metal—acquaint us with a lost civilization. Exhibit curator: Michael Moseley; designer: David Edquist. Through July 6, Hall 27, 2nd floor.

Continuing Exhibits

"American Indian Halls." The history and cultural development of the original Americans is shown from their arrival on the North American continent before 20,000 B.C. to the present. A visit to Hall 9's collections from the ancient cultures of South America will enhance your appreciation of the "Gold of El Dorado" exhibit. Halls 4 through 9, main floor.

"Ancient Chinese Culture." The important exhibit, "The Great Bronze Age of China," coming to Field Museum in August, intensifies interest in the Museum's own collections. Artifacts are arranged chronologically in the hall to show development of Chinese culture from 10,000 B.C. to A.D. 1644. A simple iron stove in one of the cases is thought to be the earliest known example of complex iron casting. Hall 24, 2nd floor.

"Gems." The central cases display raw and cut gemstones, while the cases along the walls display ancient and modern jewelry from many parts of the world. The Agusan Gold Image, opposite the entrance, is the most famous of the ancient Indian-influenced artifacts known from the Philippine Islands. Notice also the excellent Romano-Egyptian and Etruscan goldwork. Hall 31, 2nd floor.

New Programs

Gamelan Mini-Concert. Hear Field Museum's magnificent gamelan, a 24-piece Sudanese (West Javanese) ensemble of hand-carved drums, gongs, and xylophones. The Museum's gamelan classes, under the

(Continued on back cover)

Six Beautiful Books on Recent, Current, and Coming Exhibits

Available at Your Field Museum Shops

Feather Arts: Beauty, Wealth, and Spirit from Five Continents, by Phyllis Rabineau, published by Field Museum; $9.95; 88 pp., 8½"x11", 24 color plates. The catalog of the 1979 exhibit, now on national tour. Rabineau is custodian of the anthropology collections.

Treasures from the Bronze Age of China: An Exhibition from the People's Republic of China, by Robert W. Bagley, Jenny F. So, and Maxwell K. Hearn; published by the Metropolitan Museum of Art and Ballantine Books; $9.95; 192 pp., 8½"x11", 125 color plates, 13 halftones.

The Great Bronze Age of China, An Exhibition from the People's Republic of China, edited by Wen Fong, published by the Metropolitan Museum of Art and Alfred A. Knopf; $40.00; 386 pp., 9"x12", 121 color plates. Contains essays by leading authorities on Chinese art and recent excavations of artifacts on view at Field Museum from August 20 to October 29.

Gold of El Dorado, text by Warwick Bray, a striking 'coffee-table' edition published by The American Museum of Natural History and Harry N. Abrams; $9.95; 72 pp., 30 full-bleed color plates, 11½"x16". "The Gold of El Dorado" exhibit will remain on view until July 5.

Patterns of Paradise, by John Terrell and Anne Leonard, published by Field Museum; $9.95; 76 pp., 10½"x10½", 53 color plates. The catalog of the exhibit of the same name, concerning *tapa*, or bark cloth, which opened at Field Museum March, 1980, and closes in June. Terrell is associate curator of anthropology, Leonard is research specialist, Department of Anthropology.

10 percent discount for Members on all Field Museum Shop purchases

Mail Orders: *For orders shipped to an Illinois address, please add 6% sales tax (tax is not applied to orders going out of state). For all orders, please add 75¢ per book for shipping and handling. Check or money order should be payable to Field Museum. Address orders to: Field Museum Shops, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605*

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June and July at Field Museum

(Continued from inside back cover)

direction of ethnomusicologist Sue DeVale, present these free concerts. June 15, 2 p.m. and 3 p.m., Hall K, ground floor.

Courses for Adults. Register now for noncredit courses in anthropology and the natural sciences. Courses begin June 17; advance registration by mail is requested. Call 922-0733 for details.

"Pawnee Indians and Their Way of Life," a lecture by Dr. Gene Weltfish. In 1928, Dr. Weltfish began the first complete study of Pawnee language, life, and culture. Her book *The Lost Universe* details Pawnee life as it would have been in 1867. Weltfish, professor emeritus of anthropology at Fairleigh Dickinson University, will discuss the ethnology of the Pawnee based upon her study, and relate this perspective to contemporary Pawnee life. Tickets (Members, $2.00; nonmembers, $3.50) are available at the West Door before the lecture. Friday, June 20, 8 p.m., Lecture Hall I.

"Summer Fun 1980" Field Museum Workshops. July 8 through August 1. Young people from ages 5 to 12 can explore Field Museum halls through films, tours, science workshops, and craft projects. Enrollment is limited and advance registration is required by June 30. Fees vary from $3.50 ($4.50 for nonmembers) for a single session, to $16.00 ($18.00 for nonmembers) for double session classes.

Highlights include learning about animals through stories, exploring the Dinosaur Halls, casting fossils, and going on a bug hunt. Craft projects include weaving, printing leaves, pinching pots, designing African-style textiles or masks, and creating musical instruments. Children may also study Egyptian hieroglyphs or rocks and minerals. Handicapped participants are welcome, and special arrangements for the hearing-impaired have been made for selected workshops. For more details about "Summer Fun 1980" call or write Field Museum's Department of Education, 922-3136.

Summer Journey: "A Time to Play." Children's toys from around the world are located in the Museum's exhibit halls. Find the favorite toys of the Cheyenne, Shoshone, Melanesian children and many other cultures in this self-guiding tour. Free Journey pamphlets available at Museum entrances.

Weekend Discovery Programs. Each Saturday and Sunday, free tours, films, and slide programs invite you to explore Museum collections. Check the "Weekend Sheet" available at Museum entrances for programs and locations.

- "Animal Adaptations" Film Features: "Adaptations of Insects" reveals four methods by which insects adapt to unfavorable conditions. "The Mayfly" shows one life-cycle of this aquatic insect. Sunday, June 15, 1 p.m.
- "Indian Fishermen of the Northwest Coast." This 45-minute tour looks at the importance of fish in art and drama traditions as well as Northwest Coast fishing techniques. Sunday, June 15, 2 p.m.
- "American Indian Dress." Explore the construction, craft, style, and symbolism of Indian dress from six regions of North America in this half-hour tour. Saturday, June 21, 12:30 p.m.
- "Hopi Life." Examine the rich heritage of Hopi religion, symbols, and traditions in this 20-minute tour. Saturday, June 21, 1 p.m.
- "The Story Fossils Tell." This 45-minute tour focuses on the underwater world of ancient invertebrate animals. Saturday, June 21, 1:30 p.m.
- "Images of Ancient Egypt." This 45-minute slide program compares Egyptian collections found in major museums across the United States. Sunday, June 22, 1 p.m.
- "China Through the Ages." Study traditional China's inventions, court life, and schools of thought in this 30-minute tour. Rare Chinese lantern slides, collected by Berthold Laufer—Field Museum's curator of Asian Anthropology from 1907-1934—will be featured after the tour. Saturday, June 28, 1:30 p.m.
- "Indians of North America." This tour explores the daily life of six tribes. Saturday, June 28, 2:30 p.m.
- "A Curtis Portfolio of North American Indians." Half-hour slide presentation of Edward Curtis's photographs depicts early 20th-century Indian life in North America. Sunday, June 29, 1:30 p.m.
- "In the Land of War Canoes." Edward Curtis's classic 1914 film drama recaptures the life and spirit of British Columbia's Kwakiutl Indians. Sunday, June 29, 2:30 p.m.
- "Digging for Dinosaurs" Film Feature: "The Dinosaur Hunters" shows scientists at work in the Badlands of Utah. Saturday, July 5, 1 p.m.
- "Northwest Coast Indian Costume." This 45-minute slide program explores the making and use of dress, with an emphasis on woven materials. Sunday, July 6, 2 p.m.
- "Ancient Egypt." Explore the traditions of ancient Egyptian life in this 45-minute tour. Saturday, July 12, 11:30 a.m.
- "Digging for Dinosaurs" Film Feature: "Hot-Blooded Dinosaurs" examines the latest theory on dinosaurs, which proposes that these creatures did not disappear, but are alive today as birds. Saturday, July 12, 1 p.m.
- "Ancient Ocean Environments." Half-hour tour focuses on the underwater world of ancient invertebrate animals. Saturday, July 12, 1:30 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." Look at some changes in teeth and bones that characterize the great variation in today's mammals in this 45-minute tour. Saturday, July 12, 2 p.m.
- "The Ancient Etruscans." This 35-minute tour examines the culture of the Etruscans. Sunday, July 13, 12:30 p.m.
- "A Curtis Portfolio of North American Indians." Sunday, July 13, 2 p.m.

Continuing Programs

On Your Own at Field Museum. Self-guided tour booklets, adult- and family-oriented, are available for 25¢ each at the entrance to the Museum Shop, main floor north.

Volunteer Opportunities. Volunteers with an interest in Chinese culture are needed to assist with visitor services for the duration of "The Great Bronze Age of China: An Exhibition from the People's Republic of China" (August 20—October 29). Please call or write the Volunteer Coordinator, 922-9410, ext. 360, for details.

"The Ancient Art of Weaving." Learn about age-old weaving techniques and textile development during these free demonstrations. Monday, Wednesday, and Friday from 10:00 a.m. to noon. South Lounge, 2nd floor.

June and July Hours. The Museum is open daily 9 a.m. to 6 p.m., except Fridays. On Fridays the Museum is open 9 a.m. to 9 p.m.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor. Closed Friday, July 4.

Museum telephone: (312)922-9410

July/August
1980

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President: E. Leland Webber

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COVER

Gilt-bronze lamp (detail) from the Western Han period, second century B.C., is one of the rarest and most beautiful objects presented in "The Great Bronze Age of China: An Exhibition from the People's Republic of China." Height: 18 7/8 inches (48cm). Photo by Wang Yugui. *See pp. 11-17.*

FIELD BRIEFS

Thomas R. Sanders

Thomas R. Sanders Appointed Vice President for Development

Thomas R. Sanders has recently been appointed to the newly created post of vice president for development at Field Museum. As vice president, he will continue essentially the responsibilities that were his as Field Museum's planning and development officer over the past ten-year period: jurisdiction over the divisions of fund-raising, development, public relations, and membership, with the addition of two new divisions: tours and marketing. Over a three-year period, from 1972 to 1974, Sanders conducted an eminently successful Capital Campaign, which raised over $25 million dollars for Museum renovation and improvements. This was the first capital campaign in the Museum's history. During his ten years with Field Museum, the total amount of unrestricted and restricted contributions rose from $503,567 in 1969 to $2,438,020 in 1979.

Members' Preview for Chinese Treasures

Members will have the opportunity to preview "The Great Bronze Age of China: An Exhibition from the People's Republic of China" on Monday, August 18, and on Tuesday, August 19, from 1:00 p.m. to 9:00 p.m. in Halls 26 and 27. Presentation of a membership card or invitation will be requested at the entrance to Hall 26 for admittance to the preview.

"The Great Bronze Age of China: An Exhibition from the People's Republic of China," features more than 100 rare bronzes, jades, and terra-cotta artifacts and is the first showing in the West of these ancient works of art. Included in the exhibit are eight splendid, individually crafted figures from the imperial "buried army" of the First Emperor of China, the ruler who built the Great Wall. (For further details see pages 11-17.)

Because of the unusual appeal of this exhibition and our anticipation of high attendance, we request Members to attend, if possible, by this schedule: A through L on Monday, August 18, M through Z on Tuesday, August 19.

Refreshments will be served and the cafeteria will be open both evenings until 7:30 p.m. for the convenience of Members.

Lorin I. Nevling, Jr. Named Director

Lorin I. Nevling, Jr., who has held the post of assistant director, science and education, since Jan. 1, 1978, has recently been appointed director of Field Museum. Nevling's appointment divides the positions of president and director, which have been held in recent years by E. Leland Webber. Webber continues as the Museum's president and chief executive officer.

As director, Nevling will be Field Museum's chief operating officer, responsible for managing the day-to-day affairs of the Museum, its staff, and its programs.

Nevling came to the Museum in 1973 to serve as chairman of the Department of Botany, and he held that post until his appointment to the assistant directorship.

From 1959 to 1973, Nevling served on the staff of several of the botanical institutions of Harvard University, including the Arnold Arboretum, Gray Herbarium, and Farlow Herbarium. During this period he was active in research and administration, serving as curator and coordinator of systematic botanical collections.

In addition to his duties at Field Museum, Director Nevling holds several adjunct appointments at Northwestern University, Northern Illinois University, and the University of Chicago.

Lorin I. Nevling, Jr.

Group Visits for China Treasures

GROUP VISITS for the exhibit "The Great Bronze Age of China: An Exhibition from the People's Republic of China," opening August 20 and closing October 29, may now be arranged for groups as small as 30 persons. During public hours, daily except Friday, special groups of 30 to 120 persons can be accommodated. On Tuesday and Thursday evenings (after the Museum is closed to the general public) groups of 50 or more can be accommodated. Supplemental lectures for such groups, as well as private dining arrangements, are also available. For rates and other information call Caryn Friedman at 786-9570.

New Women's Board Officers

The new president of Field Museum's Women's Board is Mrs. Robert Wells Carton, elected at the board's annual meeting on May 15. Mrs. Carton succeeds Mrs. Edward F. Swift, who was elected in 1978. Other new officers elected at the meeting were Mrs. Charles S. Potter, vice president; Mrs. William H. Hartz, Jr., recording secretary; and Mrs. Gerald A. Sivage, corresponding secretary.

Continuing in their respective offices are Mrs. Roger O. Brown, vice president; Mrs. Hammond E. Chaffetz, vice president; Mrs. Charles F. Nadler, treasurer; and Mrs. Philip C. Williams, assistant treasurer.

Newly elected members-at-large are Mrs. Philip D. Block III, Mrs. James R. Coulter, and Mrs. Ben W. Heineman. Mrs. John H. Leslie and Mrs. John W. Sullivan are continuing as members-at-large.

Tifaifai of Eastern Polynesia

By JOYCE HAMMOND

At the same time that the early missionaries to the South Seas were destroying the "heathens' pagan idols" and other traditional arts, missionary wives were introducing a new art form, the Western quilt. Introduced as a utilitarian item, quilts were soon modified to the islanders' tastes and adapted to Polynesian purposes. Today, after nearly 150 years, the unique Polynesian art form of *tifaifai* continues to play an important role in many ceremonial contexts of eastern Polynesia.

In many respects, tifaifai, the generic term used here for eastern Polynesian "bedcovers," parallels the uses of western Polynesian bark cloth, or *tapa*, the indigenous material made from the inner bark of certain trees. Indeed, although the tifaifai traditions originated with the Western quilt in the early nineteenth century, the motivation behind the ready acceptance of the new art form arose from its value as a replacement for particular uses of bark cloth.

Tifaifai are common to the Hawaiian Islands, the Society Islands, the Austral Islands, and the Cook Islands. While the tifaifai traditions of different island groups share some basic characteristics, such as the use of cotton fabric and symmetrical designs, tifaifai of eastern Polynesia are distinctive for their regional variations. Even the name for the "bedcovers" varies from one place to another.

In the Society Islands, where tifaifai are known by that name, the appliqué style is most popular. A double bed-size piece of fabric is folded into eighths and cut "snowflake fashion," resulting in a symmetrical four-part design. The design is then sewn to a background fabric of a contrasting color to form the finished tifaifai. Although tifaifai are sometimes sewn by machine, handsewn tifaifai are generally considered more beautiful and valuable.

The Hawaiian quilt, or *kapa*, begins with the same design principles as the Society Islands tifaifai, but once the design has been appliquéd to the background fabric, the ensemble becomes the top layer of a quilt. A filler layer of synthetic batting (traditionally wool or moss) is placed between the design layer and a backing layer of fabric. The three layers are sewn together with quilting stitches in a distinctive Hawaiian style known as *humu lau*, or contour quilting. The quilting stitches follow the outlines of the design in consecutive patterns, moving from the center of the quilt outwards. A

Tiare Tahiti, *or "Tahitian Flower," Society Islands appliqué tifaifai design. Photo by Joyce Hammond (1977).*

Women of Rurutu, in Austral Islands, prepare to wrap wedding couple (left) in tripiti, or tifaifai. Photo by Joyce Hammond (1978).

skillful Hawaiian quilter will arrange her quilting lines painstakingly to line up the "peaks of the waves," as the points of the quilting lines are called. The ocean metaphor is sustained in the name of the quilt's border, *ho'opaepae*, which means "going ashore."

On the island of Rurutu, in the Austral Islands, *iripiti* are created by sewing many small pieces of fabric together in a fashion comparable to the piecework or patchwork quilt of the Western world. Although some iripiti incorporate various geometrical shapes of fabric sewn together by machine, the most characteristic iripiti style is that made from hundreds of one-inch-square pieces of fabric carefully stitched together by hand. A backing layer of fabric is placed behind the mosaiclike design layer.

Tivaevae in appliqué and piecework styles are equally popular in the Cook Islands. Appliqué tivaevae are made from different pieces of variously colored fabric arranged on a background cloth. Although the design is not continuous, as in the Hawaiian and Society Islands appliqué styles, the symmetrical four-part arrangement is indicative of an historical evolution from the same design principle. Cook Islands appliqué tivaevae are distinctive in their use of elaborate handsewn embroidery. The embellishment of design motifs, with various sewing stitches in multicolored embroidery floss is particularly well suited to the use of separate design elements. Cook Islands piecework tivaevae are similar to Austral Islands iripiti, although a greater variety of geometrical shapes are popular. Piecework tivaevae, like appliqué tivaevae, are invariably handsewn.

Motifs for Polynesian tifaifai are many and varied. The Protestant missionary influence in eastern Polynesia is evident in some tifaifai motifs and names. In Hawaii, for example, historical quilt names include "Forbidden Fruit," "King Soloman's Porch," and "The Garden of Religious Light." A popular contemporary Society Islands tifaifai motif is "Joseph's Dream," a design which incorporates symbols of the biblical dream such as the moon, stars, and wheat. The majority of tifaifai designs, however, seem to originate from a Polynesian interest in natural phenomena. The most popular motifs used as design elements include flowers and other plants, winds, waterfalls, oceans, and scenes of natural beauty. The "Tahitian Flower" and "Apetahi Flower" motifs of Society Islands tifaifai celebrate the national flower of the Society Islands and the unique Apetahi flower, which grows only on the summit of Mount Temehani on Raiatea. "The Breadfruit," "The Pineapple," and "Plumeria" are Hawaiian quilts easily identified by their designs. Other Hawaiian quilts incorporate designs which must be interpreted on the basis of the quilt names. Poetic names such as "Rippling Sea of Kahului," "The Mists of Eleile," and "The Wind that Wafts Love from One to Another" are as distinctively Polynesian in their rendering of natural phenomena as the quilt designs they describe.

Even the abstract designs of piecework style tifaifai suggest naturalistic motifs to the

---

Joyce Hammond, a doctoral candidate in anthropology at the University of Illinois, Urbana, has been a lecturer for the Learning Museum Program at Field Museum and is currently teaching "Women's Folk Arts: Reflections on Women's Lives," an Adult Education Course at the Museum.

The late high commissioner of French Polynesia, Charles Schmitt, is wrapped in tifaifai on the island of Rangiroa, in the Tuamotus, east of the Society Islands. In centuries past, captains Cook and Bligh had been similarly honored. Photo by Claude Claverie (1977).

Polynesians. "The Turtle," "The Octopus," "The Butterfly," "Stars," and "Hibiscus" are names of abstract piecework tifaifai designs. In some piecework tifaifai, particularly those created from small squares, mosaiclike pictures of birds, plants, flowers, and other objects are created by juxtaposing the colors of the fabric pieces.

A number of motifs in both piecework and appliqué tifaifai styles are drawn from objects of interest to the Polynesians. Leis, or garlands of flowers, are an important part of Polynesian culture and provide the inspiration for many tifaifai motifs. Other objects include anchors, fans, and lamps.

History has also figured in the choice of tifaifai motifs, particularly among the Hawaiians. The appearance of Halley's Comet, the discovery of pearls at Eua, Oahu, and the use of the first carrier pigeons in the mail service of Kauai have all been commemorated in Hawaiian quilt designs. When the Hawaiian monarchy was overthrown in 1898, and the Hawaiian flag officially banned, a quilt design entitled "My Beloved Flag" evolved to commemorate the Hawaiian monarchy's flag and coat of arms. Such quilts were covertly created and sometimes hung secretively on the under side of four-poster canopies.

Other symbols of royal power, both Polynesian and European, have figured in tifaifai traditions. In Hawaii, a popular quilt motif, "Crowns and Kahilis," incorporates the historical Hawaiian royal symbols of the crown and the *kahili*, a feather standard. Traditionally, this quilt motif is executed in red and yellow, the official colors of Hawaiian royalty. A crown motif is also popular in the Cook Islands, which have been under English rule for many years. In 1967, when the Duke and Duchess of Kent visited Rarotonga on an official visit, they were presented with a beautiful piecework tifaifai with crown motifs. When the Queen of England visited at another time, she was presented a tifaifai with a coat of arms design adapted from a picture on a Grey's tobacco package.

Some tifaifai designs hold symbolic meanings for those who create them and those to whom they are given. Love, sorrow, and yearning may motivate the motif selection and naming of a Polynesian tifaifai. For example, a woman from the Society Islands told me that she selected "A Head Garland of the Fruit of the Pandanus" design for her son's wedding present because her son was like a crown for her. A Hawaiian woman recounted that her grandmother had made a quilt for her with a breadfruit design because as a small child the granddaughter had been fed a great amount of breadfruit.

Tifaifai are made almost exclusively by middle-aged and older women working individually or in groups. Young women and girls are often too busy with school, jobs, or young children to devote time to creating tifaifai. General sewing skills are often taught in the schools, but many women learn to make tifaifai from friends, relatives, or by observing others' work.

Piecework tifaifai, the oldest tifaifai style throughout eastern Polynesia, was first introduced as a group art form based on the Western quilting bee. Since Polynesian women were accustomed to working in groups on bark cloth, they easily transferred their communal work patterns to tifaifai. In many instances, women shared their fabric scraps and labor in order to acquire tifaifai on a rotating basis. In the Austral Islands and the Cook Islands, where piecework tifaifai are still very popular, women continue to work together in groups based on kinship, friendship, and common interest. In the Society Islands and the Hawaiian Islands, where the appliqué-style tifaifai is more prevalent, women often prefer to work individually. Many women feel that a tifaifai will be more beautiful if it is created in a consistent fashion by one person alone. Machine-sewn tifaifai are gaining acceptance in the Society Islands and are often created individually by women who seek economic profits by selling tifaifai to other Polynesians. Individual work is also encouraged by a highly westernized Polynesian life style and tifaifai competitions which honor one person's achievement.

Tifaifai patterns are the property of those

Tivaevae manu *(appliqué) on the floor and* tivaevae taorei *(piecework) on the walls and ceiling create a special arena for a Rarotongan haircutting ceremony. The individual braids on the boy's head are cut by relatives and friends invited to the ritual. Photo courtesy Johnson's Photographic Studios (1973).*

who create them, but patterns may be kept within the family from one generation to the next or exchanged between friends. Some tifaifai motifs are unique; patterns may be destroyed immediately after use. Other tifaifai designs are very common, with individual interpretations providing variations on the theme. Tifaifai rules of ethics ensure creativity, since it is considered improper to copy another's design directly. In Hawaii, women who stole quilt patterns were sometimes ridiculed publicly in the derisive words of a hula.

Just as the esthetic principles of tifaifai traditions have drawn from both Western and Polynesian sources, the uses of eastern Polynesian tifaifai reflect traditional roles of bark cloth as well as innovative uses arising from cultural change. In contemporary eastern Polynesian societies, tifaifai play important roles in life-crisis ceremonies, cyclic ceremonies; and ceremonies honoring high-status individuals.

In life-crisis ceremonies, those rituals enacted to emphasize and support individuals' physical and social changes, tifaifai have replaced the use of bark cloth as a highly esteemed gift presented to the individual or individuals undergoing transition. Sometimes they are also used as decoration for the area in which the rites are celebrated. In the past, bark cloth was used throughout eastern Polynesia as a socially valuable gift to confirm a change in social status and to establish bonds between participating parties; today, tifaifai figure importantly as gifts for birthdays, coming of age ceremonies, weddings, and funerals.

Tifaifai are especially important in wedding ceremonies throughout eastern Polynesia. In the Society Islands and the Cook Islands, tifaifai are often used to decorate the walls and sometimes the ceilings of buildings used for the wedding feast. In the Society Islands, a canopy and backdrop of tifaifai are sometimes erected as a special area where the wedding couple stand to receive congratulations.

On the island of Rurutu, in the Austral Islands, gift tifaifai are ceremoniously wrapped about a couple during the wedding festivities. The symbolic act of binding the man and woman together in a bedcover serves to sanction and legitimize their social and sexual bond.

In the Cook Islands, the boy's coming of age ceremony is celebrated with a hair-cutting ritual. Families who plan to celebrate the ritual allow a boy's hair to grow long from infancy; most boys undergo the rite by the time they enter adolescence. During the ceremony, relatives and friends take turns cutting the boy's hair, which is plaited in braids. The number of braids one is entitled to cut is based on the amount of money and presents he or she gives. Along with clothes and some personal items, household articles, including tifaifai, are often given to be used by the boy when

Hawaiian quilt (grayed green on white) made by Mrs. Montgomery in 1930, in the collection of the Honolulu Academy of Arts. The design is Niumalu, or "Nawili Beauty." Courtesy Honolulu Academy of Arts, gift of Dora Isenberg, 1940.

Piecework tivaevae, made by women members of church congregation on island of Rarotonga, being presented to widow of their late pastor. Photo by Joyce Hammond (1978).

he matures and marries. However, the most impressive and important use of tifaifai in the hair-cutting ritual is in decorating the area in which the boy is seated for the hair-cutting. Very often the ceremony is conducted in a tentlike structure in which tifaifai form the walls, ceiling, and sometimes even the floor. The chair upon which the boy is seated may also be draped with a tifaifai. It is generally acknowledged that the use of many valued tifaifai in the hair-cutting ceremony is a way of honoring the boy.

Tifaifai are buried with the deceased in the Cook Islands, the Austral Islands, and to a lesser extent in some of the Society Islands. There is ample evidence that the practice of burying tifaifai with deceased persons, today less common than formerly, was predated by the practice of wrapping the dead in bark cloth. The principle role of tifaifai in funerals is as a symbol expressive of the love and personal loss felt for a person. For this reason, some people sacrifice their most precious tifaifai for use in the grave. Among the Cook Islanders, the number of tifaifai placed in a grave seems to have special importance as an indication of social status and the esteem of the deceased's relatives. It is not uncommon for a Cook Islander to be buried with ten tifaifai. The body may be placed on one, wrapped in another, and covered with a third. A folded tifaifai may serve as a pillow. Additional tifaifai are often placed over the closed casket or inside the grave vault itself. The symbolic message conveyed in the act of wrapping an individual in tifaifai for burial is, like the message traditionally conveyed by the wrapping of bark cloth around someone, expressive of feelings of love, esteem, and honor. As an object associated with the utilitarian function of providing warmth and protection, the tifaifai seems an especially apt symbol for expressing the emotions of the bereaved.

Various cyclic ceremonies of eastern Polynesia illustrate another way in which tifaifai have replaced some of the functions of bark cloth and, at the same time, have been adapted to cultural change. In parts of eastern Polynesia, the contemporary celebration of the New Year still retains practices dating to pre-contact Polynesian society. Throughout the Society and Austral Islands, tifaifai are used to decorate the walls and the many beds of Polynesians' homes for the New Year. In a spirit reminiscent of the way in which bark cloth was once spread out upon lines at the disposal of spiritual guests, tifaifai are now used to decorate homes to honor neighbors and relatives who visit on New Year's Day.

The *Me*, a post-contact event which originated from the introduction of the Protestant church's annual tithe collection in May, is important in the Society and Austral Islands as another cyclic ceremony in which tifaifai figure prominently. In the Austral Islands, where the Me is especially important, part of the ceremony includes the visitation of one another's homes. Tifaifai used as bed and wall decoration are important in this context as a symbolic expression of the renewal and reaffirmation of each individual's ties to the church and to other church members.

During the annual *Tiurai* festivities of French Polynesia, which center around the French independence day in July, tifaifai are used in contexts which underline their adaptive importance. Fair stalls and parade floats are sometimes decorated with tifaifai to give the festivities a decidedly Polynesian flavor.

The presentation of tifaifai to high-status individuals in order to honor them is the third major way in which tifaifai are used throughout eastern Polynesia. A traditional method of presentation is often used. The practice of wrapping a tifaifai around a government or church official has direct historical antecedents in the practice of draping bark cloth around honored individuals' shoulders. In a manner similar to that in which Captain Bligh and Captain Cook were honored

Rarotongan women work on piecework tivaevae. Photo by Joyce Hammond (1978).

with bark cloth, the late high commissioner of French Polynesia was wrapped in a tifaifai on an island in the Tuamotus, east of the Society Islands, during an official government trip. In the Cook Islands, church officials and their families are sometimes honored with presents of tifaifai which are draped about their shoulders or ceremoniously placed across their laps.

Derived from Western quilts and heavily influenced by Polynesian bark cloth uses, eastern Polynesian tifaifai have evolved into a unique Polynesian art form remarkable for its adaptation to the changing circumstances of the Polynesian people. Just as tifaifai continue to play important, viable roles in contemporary Polynesian cultures, tifaifai will undoubtedly continue to adapt to the needs and values of Polynesian people in the future. □

Rarotongan appliqué tivaevae, showing pansy design, made by Mangaitikai Roa Women's Group. Photo by Joyce Hammond (1978).

Field Museum Tours for Members

The Classical Lands:
Greece and the Grecian Isles
September 7-26

Santorini – on Grecian Isles itinerary

Under the leadership of Dr. Donald Whitcomb, Field Museum assistant curator of Near Eastern archeology and ethnology, this tour will visit Athens, the sites of ancient Corinth and Mycenae, Delphi, Olympia, Knossos, Santorini, Miletus, Skiros, Piraeus, and numerous other sites of interest in the history of western civilization and art.

Following five days and four nights in Athens, the sleek luxury motor yacht *Cavo D'Oro*, with 30 passenger cabins, will take tour members across the shimmering waters of the Aegean to some of the loveliest and most historically interesting of the Greek isles.

Cost of the tour — $3,425 (plus a $300 donation to Field Museum) — is based upon double occupancy and includes round trip air fare via American Airlines between Chicago and New York, and Olympic Airways between New York and Athens. First class accommodations will be used throughout. The package includes almost all meals (all meals while aboard the *Cavo D'Oro*), motorcoach fares, baggage handling, all transfers, taxes (except airport tax), and tips (except to tour guides), all sightseeing charges and admissions to special events. Advance deposit: $300 per person.

Death Valley, California

10-Day, Christmas Vacation, 1980

Dr. Matthew H. Nitecki, Field Museum curator of invertebrate fossils, and Prof. Stanley M. Awramik, of the Department of Geological Sciences, University of California, Santa Barbara, will lead this field trip. The all-inclusive price will be approximately $1,500. For additional information call the Tours Office today: 922-9410.

Coming up for 1981

Seven Exciting Field Museum Tours

To the Far Corners of the Earth

- India in January
- Egypt in February
- Baja California (whale-watching!) in February
- The People's Republic of China in April
- Papua New Guinea in May
- Kenya in September
- Peru in October

Write (or call) the Tours Office now, indicate which of these tours are of special interest to you, and your name will be placed on a special mailing list. As soon as itineraries, travel dates, and rates have been established, this information will be sent to you. A $50 advance deposit on any tour will reserve space for you and may be refunded, without penalty, up to 90 days before the departure date.

THE GREAT BRONZE AGE of CHINA

An Exhibition from the People's Republic of China

August 20 to October 29

Archaeology in China today promises to disclose the secrets of ancient China in much the same way that nineteenth-century archaeology revealed the ancient Greek world, both by refuting cherished notions of the later historians and by restoring myths and vanished kingdoms to history. The 105 exhibits in the present exhibition sent by the People's Republic of China, carefully selected for their aesthetic and historical importance, summarize the most brilliant achievements in recent Chinese Bronze Age archaeology.

The advent of bronze metallurgy in any ancient civilization assured the creation of better tools for increased productivity, and more effective weapons for making war.

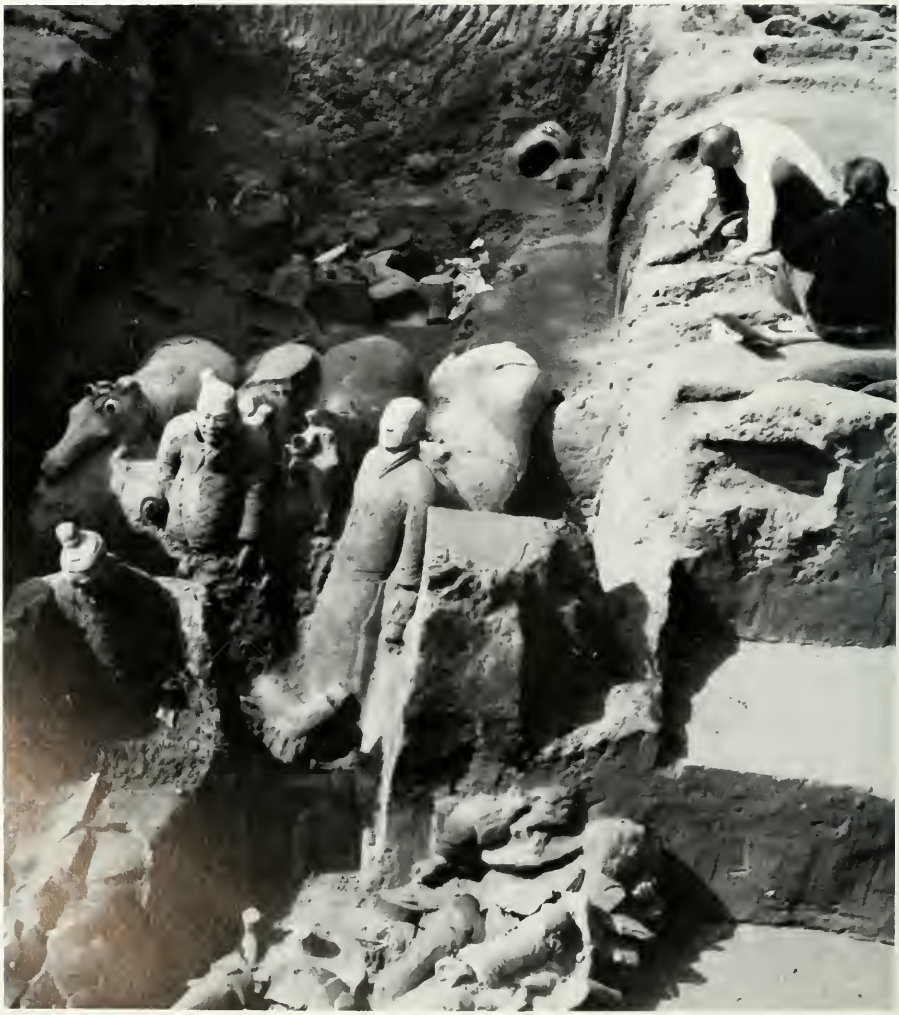
Jade pendant (huang). *Eastern Zhou (late 6th-5th century* B.C.*). Length 20.2cm (8 in.); maximum width 4.7cm (1⅞ in.); weight 76g (2⅔ oz.).*

SETH JOEL, COURTESY THE METROPOLITAN MUSEUM OF ART

In ancient China, however, bronze technology was put to a third important use, the one with which this exhibition is primarily concerned, namely, the casting of imposing drinking vessels and food containers. These objects were created for rituals in ancestral temples by kings and nobles whose rank and order were measured by the size and the number of their bronzes. Such bronzes display the incredible range of inventive genius of the ancient Chinese, who successfully combined art and industry to form some of the most accomplished and enduring works of art the world knows. Splendid works in bronze and jade, these objects stand as eloquent and tangible testimony to the great early civilizations of China. The ultimate importance of such works of art lies not only in their revealing the extraordinary skill and genius of the earliest Chinese artisans, but also in their role as keystones in the reconstruction of ancient Chinese history.

Legend has it that after King Yu of the Xia dynasty controlled the flood, about 2200 B.C., he divided his land into nine provinces, and had nine *ding* (cauldrons) cast to represent them. Thus, the "nine *ding*," also called the "Heavy Vessels of the State," or the "Auspicious Bronzes of the State," became symbols of power and prestige. When the Xia dynasty fell, it is recorded, the "nine *ding*" passed to the Shang dynasty, and, in turn, to the Zhou when they conquered the Shang.

Whether weapons or ritual vessels, bronze objects meant power for those who possessed them. In times of war, the bronze from ritual



WANG YUGUI, CULTURAL RELICS BUREAU, BEIJING

Three terracotta warriors from the eternal bodyguard of China's First Emperor, Qin Shihaungdi (221-210 B.C.) stand partly unearthed from their trench position in the mausoleum. The terracotta cavalrymen and their horses are representative of 7,500 life-size military figures found in China's Shaanxi Province in 1974. On the ground above the figures (where workers are shown studying the site) are rutted mounds – the remains of a tightly laid roof of thick planks, supported by massive wooden pillars and crossbeams that long ago collapsed. Eight of these terracotta figures are among the 105 pieces featured in "The Great Bronze Age of China: An Exhibition from The People's Republic of China."

vessels could be used to make weapons; in times of peace weapons might be transformed into ceremonial objects. After the First Emperor of Qin unified China in 221 B.C., he ordered that all the bronze vessels and weapons captured from his vanquished enemies be melted down and made into twelve colossal bronze statues to adorn his palaces. The real purpose of this grandiose act was to keep weapons out of the hands of his subjects, but, eventually, the giant bronze statues were melted down and recast into weapons by enemy invaders.

The Great Bronze Age of China, the exhibition that the People's Republic of China has lent to [the Field Museum and four other] United States museums*, makes a unique contribution to Western understanding of the greatness of ancient Chinese civilizations. It opens with the earliest known Chinese bronze vessel and concludes with the extraordinary terracotta soldiers and horses that were recently excavated from the burial complex of the First Emperor of Qin. Unlike the first Chinese exhibition of archaeological finds that toured the United States in 1974-75, which consisted of a general sampling of objects dating from the Neolithic through Yuan periods, the present show has a unified theme: it presents us with a thorough review of the most brilliant latest achievements in Chinese Bronze Age archaeology with discoveries that have fundamentally changed our knowledge of ancient Chinese history and art....–*Philippe de Montebello, director, The Metropolitan Museum of Art*. From *The Great Bronze Age of China*, copyright ©1980 by the Metropolitan Museum of Art; published in the United States by the Metropolitan Museum of Art and Alfred A. Knopf, Inc., New York.

The Great Bronze Age of China, *published by The Metropolitan Museum of Art and Alfred A. Knopf, Inc., may be purchased at the Field Museum Shops. See ad, p. 26.*

**The Metropolitan Museum of Art, New York; Kimbell Art Museum, Fort Worth; Los Angeles County Museum of Art; Museum of Fine Arts, Boston.*

The national tour of "The Great Bronze Age of China: An Exhibition from the People's Republic of China" is made possible by grants from The Coca-Cola Company; the National Endowment for the Humanities, Washington, D.C., a federal agency; and the Robert Wood Johnson Jr. Charitable Trust; it has been organized by the Metropolitan Museum of Art. Under the Arts and Artifacts Indemnity Act, indemnity was granted by the Federal Council on the Arts and Humanities.

WANG YUGUI, CULTURAL RELICS BUREAU, BEIJING

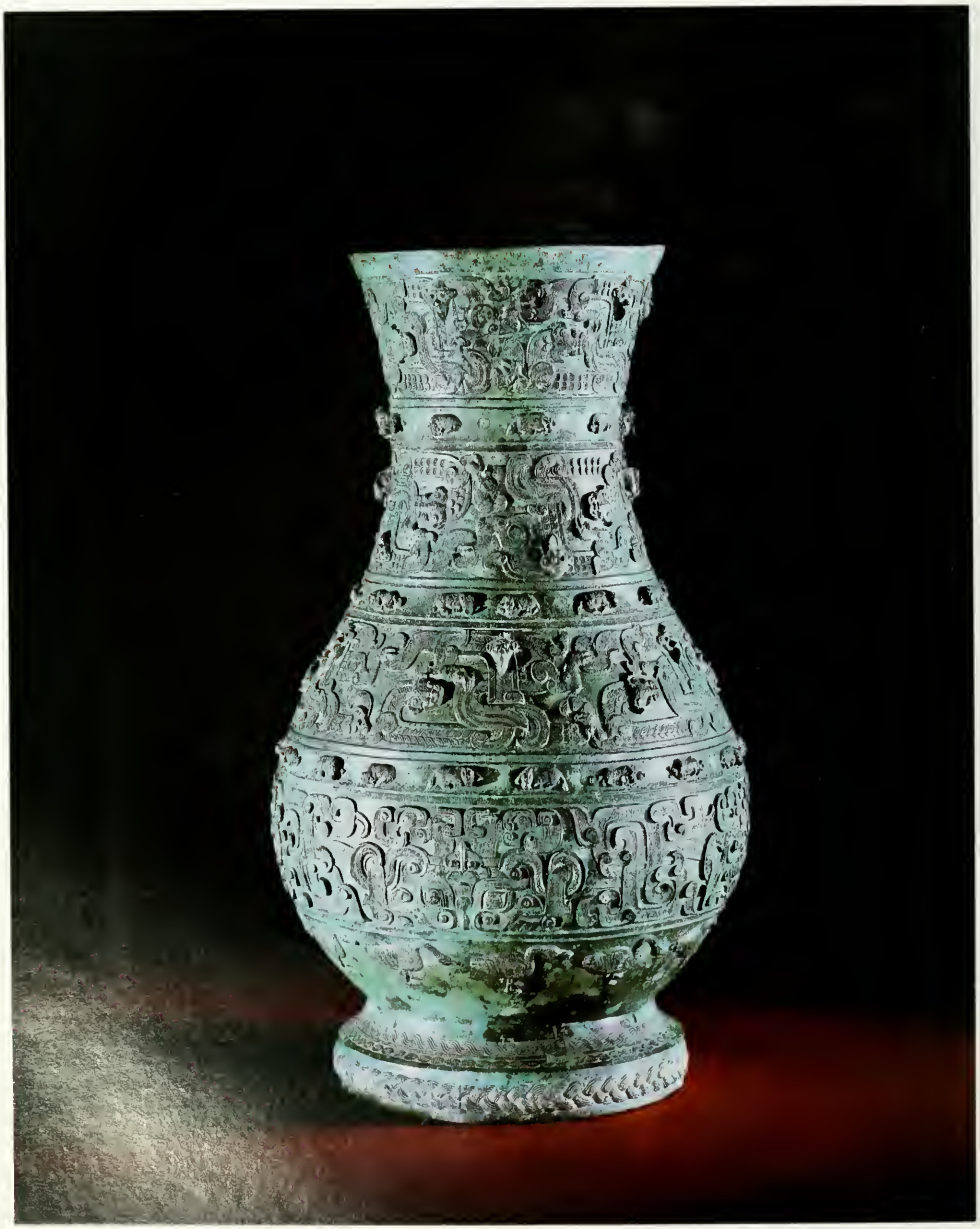
Archeology students unearth terracotta soldiers from their positions in Qin Shihaungdi's underground army. Once the excavation work is complete, the figures will be preserved as a national treasure.

SETH JOEL, COURTESY THE METROPOLITAN MUSEUM OF ART

Hu, *a type of wine vessel. Western Han (second half 2nd century B.C.). Height 44.2cm (17 3/8 in.); diameter 15.6cm (6 1/8 in.); weight 6.55kg (14 lb. 7 oz.). Gold and silver inlays form ornamental "bird-script" inscriptions, reading, in part: "Let delicacies fill the gates and increase our girth, and give us long life without illness for ten thousand years and more."*

SETH JOEL, COURTESY THE METROPOLITAN MUSEUM OF ART

Hu, *a type of wine vessel. Anyang period (ca. 1300–ca. 1030 B.C.). Height 31.4cm (12 3/8 in.), weight 2.7kg (6 lb.). Wine vessels of this slender, round-bodied shape are rare, quite distinct from those with S-curve profile and oval cross section, such as that on facing page.*



SETH JOEL, COURTESY THE METROPOLITAN MUSEUM OF ART

Hu, *a type of wine vessel. Eastern Zhou (early 5th century B.C.). Height 44.2cm (17 3/8 in.); greatest diameter 25cm (9 7/8 in.); weight 5.77kg (12 lb. 11 oz.).*

SETH JOEL, COURTESY THE METROPOLITAN MUSEUM OF ART

Gu, or drum. Fifteenth-fourteenth century B.C.? Height 75.6cm (29¾ in.); weight 42.4kg (93½ lb.). The second bronze drum known from the Shang period.

From Dust to Dignity:
Collection News from Anthropology

by **Phyllis Rabineau and Donald Collier**

The Department of Anthropology has recently completed the first stage of a major project upgrading the care of its storage collection, and has begun work on the next phase. The completed portion is housed in the former southeast lightwell, in a new facility called Central Anthropology Storage (CAS). During the recent modernizing of Field Museum's building, this space was filled in to provide four storeys of steel shelving set aside for anthropology collections. The facility includes adequate fire protection, sensitive security devices, and a climate-controlled atmosphere.

In August 1977 we began our reorganization project. Some 250,000 artifacts were moved from older, antiquated storerooms, arranged in CAS, and inventoried by means of computer printouts. The new storage location of each artifact was recorded as that of the nearest 18 x 36-inch shelf, numerically identified, a procedure which now greatly simplifies access to the collection by researchers. The inventory was designed to remove the many discrepancies, errors, and lacunae which had accumulated in the original catalog since it was initiated in 1894. Because of the dramatic improvements in the care of the collection, our moving staff began to call the project "From Dust to Dignity," a humorous yet apt description of what has been accomplished.

Collections on the move! Joyce Hammond transports African artifacts from an old storeroom to the newly modernized area.

Approximately three-fifths of our anthropology collection is now housed in CAS, and we have begun work on modernizing the care of artifacts in the remaining older storerooms. Once again, we will clean, reorganize, and inventory with computer printouts the remaining 175,000 objects. The first year of this project, called "New Dimensions in Old Spaces," is funded by a grant from the National Science Foundation, and will focus upon North and South American artifacts of organic composition— feathers, fur, woolen textiles, leathers, wood, foodstuffs. These objects are among the most perishable items in our collection; they are sensitive to insect attack, fluctuations in climate, and most likely to suffer from physical crowding. The inventory project will enable us to carefully inspect every item in the storeroom, isolate and treat those with insect damage, reorganize the storage arrangement, and alleviate the overcrowding that makes it hard to locate and inspect objects needed for research and exhibition.

We believe the achievements of the storage reorganization project to be unique among major museums in terms of magnitude, complexity, and efficiency. Field Museum moved other large collections into new facilities in the 1950s and 1960s, and in the past three years, but none of these other moves has involved this kind of inventory. The Museum of the American Indian has recently made an inventory of its large collection but without rehousing the specimens.

Phyllis Rabineau is custodian of the anthropology collections; Donald Collier is curator emeritus of Middle and South American archeology and ethnology.

Tens of thousands of potsherds have been cleaned, packaged, organized, and inventoried. Here, Paul Fini and Ethel Turnipseed prepare ceramics from the southwestern United States.

The U.S. National Museum's project to rehouse and inventory its anthropology collection, and the projects at the University Museum in Philadelphia and the Peabody Museum at Harvard University will not be finished for several years. Field Museum is recognized nationally for having taken an energetic, innovative lead in the new wave of collection management development.

It is accurate to say that the CAS project took twelve years. It began in 1968 with serious departmental and Museum-wide planning for modernization, which led to policy decisions, fund raising, architectural and engineering planning, and construction. Our new storage space was completed and cleaned in July 1977; detailed planning for the move and creating the computer catalog file had begun early in 1977, and was completed in six months. The actual moving and inventory was carried out by two teams of three persons each, plus a project assistant and an engineering-logistics specialist. These teams performed with extraordinary skill, stamina, and devotion. We would like to recognize their contribution to the success of this project by listing their names:

Edward Applebaum	Roberto Maisonave
Robert Bailey	Alan Majak
Donald Bockenfeld	Roberta Martin
Kathleen Christon	Anita Raba
Diane Cluts	M.E. Rada
George Davis	John J. Rider
Patricia Figel	Marianne Schoch
Paul Fini	Maija Sedzielarz
Theresa Gross-Diaz	Ernest Sheldon
Joyce Hammond	Sue Ann Stott
Elizabeth Koenen	Christine Taterka
Barbara Larson	Ethel Turnipseed
John Liston	Adam Wasserman
Timothy Liston	Charles Williams, Jr.

Over the three-year span of the CAS project, some eighty people in all, within and outside the Museum, contributed to its success. The work has been made possible by four generous grants from the National Endowment for the Arts, and by substantial support from Field Museum's Capital Fund for modernization. The project was directed in its first year by Donald Collier and thereafter by Phyllis Rabineau. □

Exploring A New Nation's Ancient Past: Archeology In The Marshall Islands

By THOMAS J. RILEY

Photos by the Author

As one of the most recent members of the Community of Nations, the Marshall Islands is interested not only in future development, but also in developing an understanding of its past. Located in the western Pacific some 2,300 miles southwest of Hawaii, the new nation has been under United States trusteeship from the United Nations since 1946. Now the trusteeship is ending and the Marshalls, like other island groups in Micronesia, are in a period of transition to independence. The new government is parliamentary with a Council of *Iroij* (chiefs) and an elected assembly called the *Nitijela*. The council oversees matters of custom and the president and cabinet members are chosen from the assembly.

The first president of the Marshalls, Amata Kabua, took office in 1979. Since that time the new nation has taken over most of the functions formerly overseen by the U.S., such as education, immigration, and economic development. The fleet of fieldtrip ships necessary for communications between islands are a new addition to the new government, and negotiations with the U.S. have been completed for the maintenance of the top secret U.S. missile test range at Kwajalein atoll in the northern part of the country.

The task of governing a nation like the Marshall Islands is unique and difficult. The new nation spans an ocean area estimated at over 375,000 square miles, but its land mass is confined to about 75 square miles over 34 islands. Thirty of these islands are atolls, low-lying series of sand and coral islets surrounding massive saltwater lagoons. The remaining islands are what geographers call "high islands"—volcanic masses rising out of the depths of the sea. The northern islands are often racked by typhoons and sometimes suffer

Marshallese fieldworkers prepare for the day's survey shortly after dawn. The islets to be surveyed dot the horizon.

The new government house for the Nitijela and the Council of Iroij.

from devastating droughts. This island paradise—for it is a paradise—presents a formidable set of problems in economic development for its new leaders.

Even in the midst of these problems the new Marshall Islands government has not forgotten the importance of preserving traditions and the remaining vestiges of its prehistoric past. In the mid-1970s the Trust Territory of the Pacific Islands developed an Historic Preservation Program for Micronesia. The program was designed along the same lines as those currently operating in states on the U.S. mainland, and was coordinated through Trust Territory headquarters on Saipan in the Marianas Islands.

In the Marshall Islands two committees were constituted. One of these, the Historical Preservation Committee, was charged with locating and identifying historic and prehistoric sites of significance to Marshallese culture and history. The second was a museum committee which planned the development of a museum in the capital city. As a part of the Historic Preservation Committee program, a number of projects relevant to the history and archeology of the Marshall islands were planned and are currently being executed.

One of these programs was the restoration of a nineteenth-century plantation house on Likiep, a southern atoll of the chain. The plantation house had belonged to Anton DeBrum, one of the early traders in the Marshalls. The restoration, which included cataloging DeBrum's extensive collection of papers, books, and early photographs of the Marshall islands, was conducted by Edward Jelks of Illinois State University, Bloomington.

A second project funded through the Trust Territory has been my own fieldwork, an intensive archeological survey with test excavations on Majuro, the atoll on which Rita, the capital city of the Marshall islands, is located. This latter fieldwork was conducted through the B. P. Bishop Museum, Honolulu, perhaps the foremost museum in the Pacific at the present time.

Archeological survey on a Pacific atoll is quite different from research in most parts of the mainland U.S. My own work took me to over 54 islets around the atoll, the majority of which had to be reached by boat. Test excavations, each one meter square, were excavated across the islets of the atoll at different points in order to determine whether sites lay buried beneath storm-borne sands or had been eroded away. Some of our excavations were carried down two meters or more to the limits of the freshwater table to see whether there were waterlogged deposits that had existed at times when there were lower stands of sea around the atoll.

In all, a total of 134 archeological sites were noted on Majuro. These represent different types of human settlement and activity on the atoll over the course of its history and document a settlement that goes back to the time of the dark ages in Europe and perhaps as far back as before the time of Christ.

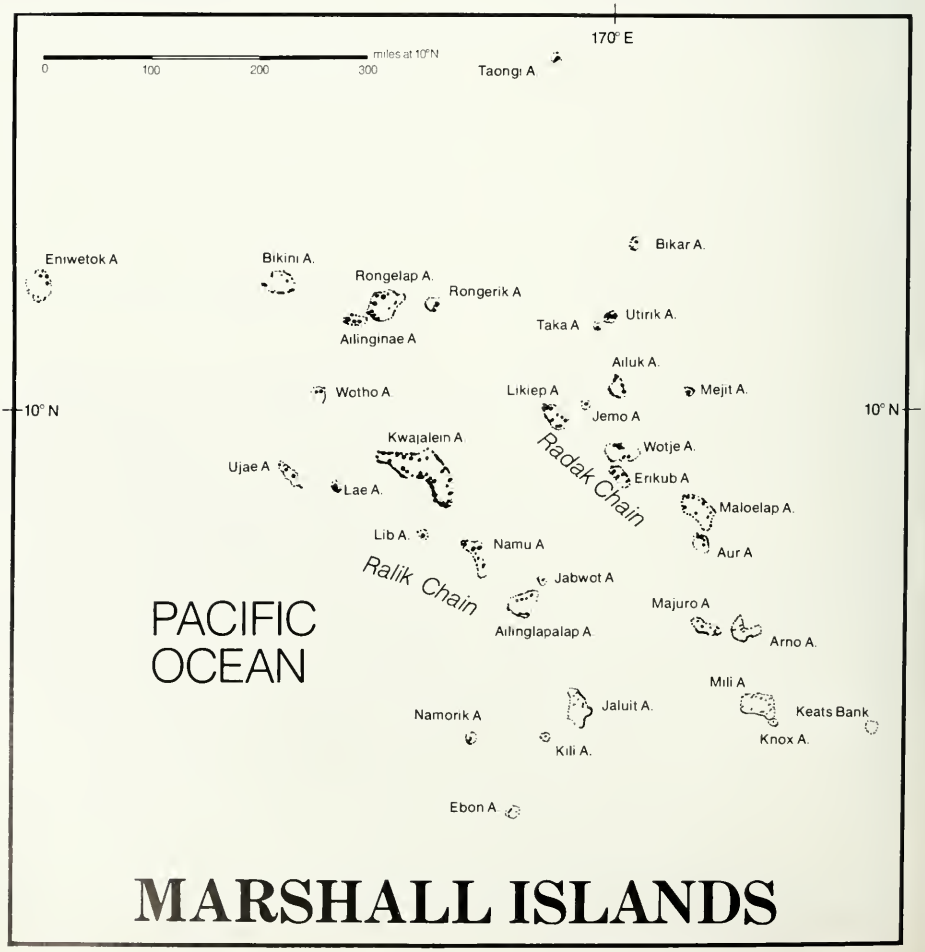
The earliest permanent settlement on the atoll appears to have been at Laura village on the western end, opposite the present capital

Thomas J. Riley is a staff archeologist with the Bernice P. Bishop Museum, Honolulu, and currently on leave from the University of Illinois–Urbana, Department of Anthropology.

city of Rita. Here the most concentrated human settlement was near the lagoon side of the atoll, and the garbage noted at sites consisted mostly of strombus shell, suggesting intensive collecting of marine resources around the lagoon reef. In contrast to the concentrated settlement at Laura, the rest of the atoll showed signs of scattered homesteads with little depth to deposits and not much strombus shell in the garbage. On some islets no settlement was found at all, and the little archeological debris recovered probably represented specialized use in fishing or turtle-hunting expeditions.

At first my Marshallese survey crew and I had a difficult time identifying many of the house sites scattered around the atoll. The only surface remains left were a scattering of small white coral pebbles. These pebbles are the remnants of paved houseyards. Even today one often sees Marshallese women and children gathering the small pebbles on the beaches. They spread these pebbles, often tens of cubic yards of them, around the houseyards to keep them dry in the torrential rains.

In a few places, mostly away from houses, small coral-faced enclosures represent the places of traditional Marshallese burials. Some of these burials were on small uninhabited islets on the north side of the atoll. Ethnohistoric documentation by early explorers relate that the dead had to be removed from the vicinity of houses so that their spirits would not



bother the living.

The portable artifacts recovered by us in our survey and excavations included adzes of tridacna clam and other shell as well as peelers for breadfruit and the great swamp taro, some small amounts of fishing gear, fowling weights, a fragment of a large helmet shell trumpet for communicating across the lagoon, drill bits, and a large variety of ornaments including shell arm rings and what we believe to be ear extenders. These last were used to extend the size of the pierced earlobes that were considered a mark of beauty among Marshallese at the time of European contact.

The breadfruit and taro peelers recovered in the excavations at Laura related to two of the staple crops of the Marshallese before contact with European culture. A zone of irregular pits, at least some of which were excavated at the time of the earliest settlement of Majuro, was noted in the center of the islet behind the major prehistoric settlement at Laura village. These pits had been excavated to pierce the so-called Ghyben-Herzberg lens, the lens of freshwater that floats on the saltwater beneath the mass of larger islands. Here the giant swamp taro, *Crytosperma chamissonis*, was grown. It was one of the crops usable all year round on Majuro during prehistoric times.

In the same area extensive groves of breadfruit, *Artocarpus incisus*, provided nourishment from June through September and the fruit was often preserved in a fermented paste. A third staple crop not represented indirectly by artifacts recovered in our excavations was pandanus. This was eaten raw, steamed, or preserved like breadfruit in a fermented paste. In our survey we recovered few small items directly related to fishing, even though we know it was important in prehistoric and traditional Marshallese economy. The portable artifacts that we did recover included one-piece fishhooks and tridacna shell lures that were used for trolling in the waters of the lagoon and the ocean outside the reef.

We did, however, record a larger number of fishtraps, and it is obvious that these devices played a major part in the fishing activity of the Marshallese before European contact. They are still important on Majuro today. The fishtraps are essentially stone wiers about 2 feet high and shaped like a V with a circle near its apex. They are located in passes between islets, with their openings facing against the current. Large schools of mackerel-like fish are periodically caught in these traps, sometimes tons at a time. The nearly 50 traps noted in the survey suggest that this form of fishing was perhaps more important than line fishing in terms of providing periodic surpluses of marine protein for Majuro's prehistoric inhabitants.

One of the interesting features of the survey that we did on the atoll was the distribution of archeological sites. Only one housesite was noted on the eastern end of the atoll, and it appeared that it might have been abandoned only after World War II, when the U.S. government constructed an airstrip in the immediate vicinity.

No signs of taro pits or fishtraps were noted on this end of the atoll either. It is possible that this area of the atoll was not favored for human settlement in prehistoric times even though it is today the location of the largest city in the Marshall islands, a community with several thousand residents. It is equally possible that storms devastated the area. We know from historic accounts that in 1905 and 1918 typhoons scoured parts of the atoll. A severe storm at sea in late 1979 generated waves that did such damage to the capital city that the atoll was declared a disaster area by president Carter. I am planning to return to Majuro later this year to asses the damage to archeological sites on the atoll. If there are patterns to the destruction then we might have the beginnings of an explanation of the apparent lack of settlement on the eastern end of Majuro.

The beginnings of human settlement on Majuro are obscure right now, but several radiocarbon dates have been submitted from the sites where we did our initial excavations, and an earlier trench excavated by Paul Rosendahl in 1977 yielded a date of 703 ± 80 B.C., and we fully expect that Majuro itself had a much longer history than that date implies.

Our expectations are based on linguistic evidence. The language of the Marshall Islands is closely related to other languages in eastern Oceania and apparently split off from them somewhere in the area of the Banks-Northern New Hebrides islands of Melanesia to the south. One scholar suggests that this linguistic split occurred about 3,000 years ago. If this is the case then we might reasonably expect people to have settled Majuro at or before the time of Christ. We might also expect the early assemblages in the Marshall Islands to look like those of the newly independent Kiribati (formerly the British-controlled Gilbert Islands) to the south.

These are some of the questions that govern the prehistoric research in the Marshall Islands. They remain to be answered in detail in archeological investigations. What is important, though, is that the newly independent Marshall Islands government, heavily involved in the determination of its future, recognizes the importance of learning about, and from, its long and relatively little known past.

Letters from Brazil

Timothy Plowman, assistant curator of botany, reports on his field work in northern Brazil

Feb. 13, 1980, Redenção
Dear friends,
I'm sitting in the middle of a rice field amid charred logs, cornstalks, and squash vines. The sun is going down over the next haystack hill in this range of endless mountains which have no name. No one here ever heard of the name on the map–"Serra dos Gradaus"–where we suppose ourselves to be. We just finished a good meal of paca *(a large rodent) killed last night by our woodsman Mario (he has also supplied us with turtle, caiman, and various chickens), along with rice, beans, spaghetti, farina, and guaraná to drink.*

This is the nicest place we've been so far–good forest to camp and collect in, but with a varied terrain to tramp around, including many exposed granitic outcrops–both wet and dry–all with very interesting plants. Not much in flower now though since we're at the middle of the rainy season (5-6 months) and most trees and shrubs are in fruit. We are finding many things new (at least to us) including Rafflesiacese, Burmanniaceae, Quiinacese, Vellozias, and several endemic tree genera and species. There are 4 erythroxylums here, 3 of which are new. Also many orchids and unusual terrestrial aroids. The collecting and hiking are great, but making, pressing, and drying 11 duplicates of each plant are tedious and time-consuming.

We are trying to send all dried plants back to Belém as we travel or we'd be inundated with specimens; even with 2 vehicles, it's cramped traveling with 5–and soon we'll be joined by another Brazilian. We have a pretty good working team now and everyone does his job–one of the climbers does all the cooking and dishwashing, which is good for the morale of the rest of us.

The Portuguese spoken here is a far cry from what I studied in summer school, but I'm slowly relearning the names of everything in the Amazonian dialect. (The dictionary is no help, being based on the language of Portugal.) The evening is beautiful with many crickets and tree frogs, 3 or 4 serenading birds, screeching parrots and occasional monkey howls. A jaguar stole 2 pigs on the next farm last month but we haven't seen any signs of the big cat. But the area is rugged enough to support wildcats and still little penetrated by colonists. The land is very hilly and the soil nothing but coarse quartzitic gravel. This rice field might be good for a second harvest but even that won't be a great one. It will then be abandoned or burned off again in the dry season to plant forage grasses. Most of the good level land is already occupied by big *fazendas–Texas style–with private airports and intensive modern ranching–the leftovers go to the poor farmers moving in mostly from the northeast and populous Goiás State.*

We are all in good health thanks to country living, fresh air and unpolluted water. Except for ant bites and wasp stings, no major encounters with the creatures and we haven't seen a single snake of any sort. Well, the no-see-ums and mosquitoes are on the rise so I'll retire to my hammock and mosquiteiro–tomorrow we leave early for Redenção to dispatch 6 crates of plants–about 3,500 specimens–and to head off to our next locality.
With warm regards from Balmy Brazil,
Tim

March 5, 1980, Belém
Dear Bill,
It was good to hear from you and news of the north. I wrote and posted a letter to you from Redenção but you might not get it for months. The road situation became impossible with the continuing heavy rains plaguing all of north Brazil–worst in recorded history. Of the 3 roads out of Redenção, two were completely closed while we were there due to washed-out bridges. The third–partly asphalted–was ok till we reached the Rio Arraia (pronounced more or less like Ohio)–the rickety wooden bridge and 3 km of road were 1 meter under water. We waited 3 days and finally a makeshift ferry appeared–a platform mounted on 2 dugouts–but it carried our 2 overloaded vehicles across (for an exorbitant price). Then it was 300 km of mudholes, mostly with huge overloaded lumber trucks stuck in them–counted at least 20–usually on the upgrades and jackknifed across the road.

It became ridiculous after a while and we kept good spirits–and miraculously detoured, pick and shoveled, pushed and towed until we got our VW van and Brazilian Ford Jeep through. Got in some good collections along the way–somehow. So finally to the Belém-Brasilia highway and asphalt (beloved asphalt at this point). We started north toward our next destination: Marabá and Tucuruí on the Rio Tocantins. When we reached the river we found lines and lines of trucks stacked up–the only bridge was flooded at both ends and the supports were cracking. The asphalt had worn off the surface and the water had carried off much of the roadbed. Não pasa!

We took a rapidly deteriorating road parallel the river and downstream to the city Tocantinópolis (Marabá was already out of the question–no road and ¾ of the city underwater), where rumor had a ferry crossing. We arrived to find one of two ferries still functioning but you had to make a run through thick mud on the river edge, line up on two planks and then onto the boat. We got across on the last day before the police prohibited the ferry altogether. Now there are 4,000 vehicles stranded on either side of the river and Brazil's main north artery cut. Tons of fresh fruit and

produce being dumped in the river, etc. It's a disaster. You can only reach Belém now by road via a 1,000-km detour through the Northeast. Luckily we were able to avoid that route or weeks of waiting for a new bridge or ferry.

We stopped to collect along the Belém-Brasilia highway on our way back. There are still a few patches of primary forest near the road where we found a number of very interesting plants. Gerrit began getting feverish here and with diarrhea. When we reached Belém, he was really in bad shape with an assemblage of dire symptoms – his temperature hit 106° this PM so we rushed him to the hospital. They did a blood test on the spot. Diagnosis:* Plasmodium falciparum *– malaria. So we've got him in good hands. He didn't really let us know he was feeling so bad till it was serious. Very fortunately, we were on our way back to Belém and not stuck in some Godforsaken village. I think he'll be OK – the treatment takes about a week. One of the tree-climbers was also feeling bad (symptoms similar to Gerrit's), but we don't know yet how he is. (I'm fine – perhaps for taking Chloroquine weekly.)*

Our plan now is to travel by plane if possible to Tucuruí and make some collections at the site of the new hydroelectric dam – I'll probably go alone while Gerrit recuperates in Belém – it's up in the air now but we're really stuck as far as road travel. There are many areas accessible by river from Belém and we can always work around here. I hope Gerrit will stay put long enough to get over this – he really was over-working even after he started with the fevers and headache symptoms – chopping down big trees *for instance.*

We have a great deal of plant material now to sort through – about 1,400 numbers with many fruit and wood collections, bryophytes, fungi and materials for chemical analysis. I'll work on that in the next few days. We figured we needed at least 7 duplicates for Field Museum and Missouri Botanical Garden to get a specimen so extra work always goes to finding enough of the same species. Still, there are many unicates especially of our cerrado [dry scrub-savannah of central Brazil] collections.

Well so much for the tales of woe and hard work – we've all benefitted a lot from the trip so far, we've learned a lot about the vegetation here which is really so rich and complex, especially in the cerrado and Amazonian forest transition zone where we were mainly working. I hope my slides come out so I can share some of it with you in pictures.
Still raining in Belém, Chaozinho,
Tim

TIM PLOWMAN

Mario, our woodsman, with paca *that provided our evening meal. We also dined on turtle and caiman.*

*Dr. Gerrit Davidse, Missouri Botanical Garden grass specialist

BOOKS

Six Beautiful Books on Recent, Current, and Coming Exhibits
Available at Your Field Museum Shops

Feather Arts: Beauty, Wealth, and Spirit from Five Continents, by Phyllis Rabineau, published by Field Museum; $9.95; 88 pp., 8-1/2"x11", 24 color plates. The catalog of the 1979 exhibit, now on national tour. Rabineau is custodian of the anthropology collections.

Patterns of Paradise, by John Terrell and Anne Leonard, published by Field Museum; $9.95; 76 pp., 10-1/2"x10-1/2", 53 color plates. The catalog of the exhibit of the same name, concerning *tapa*, or bark cloth, which opened at Field Museum March, 1980, and closed in June. Terrell is associate curator of anthropology, Leonard is research specialist, Department of Anthropology.

Gold of El Dorado, text by Warwick Bray, a striking 'coffee-table' edition published by The American Museum of Natural History and Harry N. Abrams; $9.95; 72 pp., 30 full-bleed color plates, 11-1/2"x16". "The Gold of El Dorado" exhibit will remain on view until July 5.

The Gold of El Dorado, by Warwick Bray, published by Times Newspapers; $6.95; 240 pp., 7-1/2"x10", 38 color plates, over 400 halftones. The catalog of the exhibit.

Treasures from the Bronze Age of China: An Exhibition from the People's Republic of China, written and edited by Katherine Stoddert Gilbert, based on texts by Robert W. Bagley, Jenny F. So, and Maxwell K. Hearn; published by the Metropolitan Museum of Art and Ballantine Books; $9.95; 192 pp., 8-1/2"x11", 125 color plates, 13 halftones.

The Great Bronze Age of China, An Exhibition from the People's Republic of China, edited by Wen Fong, published by the Metropolitan Museum of Art and Alfred A. Knopf; $25.00; 404 pp., 9"x12", 121 color plates. Contains essays by leading authorities on Chinese art and recent excavations of artifacts on view at Field Museum from August 20 to October 29.

10 percent discount for Members on all Field Museum Shop purchases

Mail Orders: For orders shipped to an Illinois address, please add 6% sales tax (tax is not applied to orders going out of state). For all orders, please add 75¢ per book for shipping and handling. Check or money order should be payable to Field Museum. Address orders to: Field Museum Shops, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605.

July, August, and September at Field Museum

(July 15 through September 15)

New Exhibit

"The Great Bronze Age of China: An Exhibition from the People's Republic of China." This exhibit features recent discoveries that have fundamentally changed our knowledge of ancient Chinese history and art. The 105 masterpieces, dating from about 1,500 B.C., include 86 bronze ritual wine cups and vessels, 11 jade sculptures, and eight lifelike terra-cotta figures from the spectacular "buried army" of China's first emperor. Don't miss the most important archeological exhibition ever to come out of China! Exhibit curator: Bennet Bronson; designer: Clifford Abrams. Opens August 20, Halls 26 and 27. Members' preview: August 18 (A-L), 19 (M-Z). For further information see below, under "New Programs."

Continuing Exhibits

"Place for Wonder" encourages a hands-on approach to learning. You can touch a rattlesnake skin, examine a dinosaur bone, or try on a mask from the People's Republic of China. Open weekdays 1 p.m.-3 p.m.; weekends 10 a.m.-noon, and 1 p.m.-3 p.m.

"Primitive Art." Compare the art of primitive societies of Africa, the Americas and Oceania. The relationship of primitive art to modern art is also considered. Hall 2, main floor.

"Tibetan Culture" can be explored through rare film footage, shot in 1927, that documents nomadic life and religious pageantry. The exhibit is divided into two sections. One hall displays common possessions of the past such as weapons, yak-herding equipment, and textiles. Lamaism, the Tibetan form of Buddhism, is the theme of the second hall. Hall 32, 2nd floor.

New Programs

"Weekday Highlight Tours" focus on the Museum's most popular exhibits. Learn about American Indian rituals, the culture of ancient Egypt, or animal life around an African watering hole. These one-hour guided tours meet at the North Information Booth, 1 p.m., Monday-Thursday, July 7 through August 28.

"China Festival." Enjoy this day-long celebration of Chinese culture. Festivities begin with the Chinese Lion Dance on the north steps of the Museum. Other special events include Chinese painting, calligraphy, music, martial arts, table tennis, Chinese cooking, special tours, and more. Events will be held in Stanley Field Hall and throughout the Museum. This free festival is supported by a grant from the National Endowment for the Humanities, a federal agency. Sunday, July 20, 11 a.m.- 5 p.m.

Members' Preview to "The Great Bronze Age of China: An Exhibition from the People's Republic of China." The Museum's new exhibit will be open exclusively for Members on two evenings. After touring the exhibit, join Museum staff for refreshment and conversation. The cafeteria will remain open until 7:30 p.m. The following alphabetical schedule is suggested: A-L, Monday, August 18; M-Z, Tuesday, August 19. 1 p.m.-9 p.m., both days. Halls 26 and 27.

Films on Ancient China. These free films are offered for the duration of "The Great Bronze Age of China" exhibit, which opens August 20, 1980. Featured films include "China: The Beginnings," "China: Hundred Schools to One," and "China: The First Empires." Films are screened Friday, Saturday, and Sunday at 11 a.m., 12:30 p.m., and 2 p.m. in Lecture Hall 1.

"The Great Bronze Age of China" Lecture Series. China scholars lecture on the significance of China's recent archeological discoveries—how these finds have rewritten the Chinese past, and how they have changed Western views of Chinese history and art. Fridays, 8 p.m., Sept. 5, 12, 26, and Oct. 3. Call 922-3136 for ticket information.

Weekend Discovery Programs. Each Saturday and Sunday between 11 a.m. and 2 p.m., the Museum offers a variety of free, exhibit-related tours, demonstrations, and films on current natural history topics. Check the "Weekend Sheet" available at Museum entrances for locations and additional programs.

- "American Indian Dress." Learn about the construction, craft, style, and symbolism of Indian dress from six regions of North America in this 30-minute tour. Saturday, July 19, 11:30 a.m.
- "Digging for Dinosaurs" Film Features: *Dinosaurs: The Terrible Lizards* examines the different kinds of dinosaurs that dominated the earth. *The Dinosaur Who Wondered Who He Was* uses animation to tell its story. Saturday, July 19, 1 p.m.
- "Ancient Ocean Environments," a half-hour tour, focuses on the underwater world of ancient invertebrates. Saturday, July 19, 1:30 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." This 45-minute tour looks at changes in teeth and bones that characterize the great variation in today's mammals. Saturday, July 19, 2 p.m.
- "Digging for Dinosaurs" Film Features: *Dinosaurs* traces these creatures from development to extinction. *Dinosaurs in the Wall* visits Dinosaur National Monument in Utah and Colorado. Saturday, July 26, 1 p.m.
- "Ancient Ocean Environments." Saturday, July 26, 1:30 p.m.

(Continued on back cover)

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July, August, and September at Field Museum

(Continued from inside back cover)

- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." Saturday, July 26, 2 p.m.
- "Ancient Etruscans," a 35-minute tour, looks at the everyday life, religion, and funerary practices of these people. Sunday, July 27, 1 p.m.
- "Ancient Egypt." This 45-minute tour explores the traditions of this culture from daily life to myths and mummies. Saturday, August 2, 11:30 a.m.
- "Ancient Ocean Environments." Saturday, August 2, 1:30 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." Saturday, August 2, 2 p.m.
- "Ancient Etruscans." Sunday, August 3, 12:30 p.m.
- "Africa, the Changing Continent" Film Features: *Nawi* and *Malawi*. Saturday, August 9, 1 p.m.
- "Ancient Ocean Environments." Saturday, August 9, 1:30 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." Saturday, August 9, 2 p.m.
- "Culture and History of Ancient Egypt." This 45-minute tour concentrates on Field Museum's collections of ancient Egyptian artifacts, and concludes with a description of the mummification process. Sunday, August 10, 12 noon.
- "American Indian Dress." Saturday, August 16, 11:30 a.m.
- "Africa, The Changing Continent" Film Features: *Arts and Crafts of West Africa*" and East African Wood Carver. Saturday, August 16, 1 p.m.
- "The Inside Story: Some Adaptations of Mammals' Bones and Teeth." Saturday, August 16, 1:30 p.m.
- "Culture and History of Ancient Egypt." Sunday, August 17, 12 noon.
- "The Ancient Etruscans." Sunday, August 17, 1 p.m.
- "Africa, the Changing Continent" Film Features: *Africa Dances*. Saturday, August 23, 1 p.m.
- "Ancient Ocean Environments." Saturday, August 23, 1:30 p.m.
- "Culture and History of Ancient Egypt." Sunday, August 24, 12 noon.
- "Ancient Etruscans." Sunday, August 24, 1 p.m.
- "Africa, the Changing Continent" Film Features: *Women Up in Arms*. Saturday, August 30, 1 p.m.
- "Subsistence Societies" Film Features: *Slash and Burn Agriculture* and *Turtle People*. Saturday, Sept. 6, 1 p.m.
- "Prehistoric Life in the Illinois Valley." This half-hour tour discusses how these people adapted to their environment through the use of tools. Sunday, Sept. 7, 1 p.m.
- "Ancient Egypt." Saturday, Sept. 13, 11:30 a.m.
- "Subsistence Societies" Film Features: *Bitter Melons*. Saturday, Sept. 13, 1 p.m.
- "Clay Dinosaurs." Children look at dinosaur skeletons and then make their own clay dinosaur to take home. Meet in Hall 38, 2nd floor. Sunday, Sept. 14, 11 a.m.-1 p.m.

Continuing Programs

Summer Journey: "A Time to Play." This self-guided tour takes families to many Museum halls, where toys from around the world may be found. Watch for a new *Fall Journey* in September. Free *Journey* pamphlets are available at Museum entrances.

Volunteer Opportunities. Volunteers with an interest in Chinese culture are needed to assist with visitor services for the duration of "The Great Bronze Age of China" exhibit (Aug. 20-Oct. 29). Please call or write the Volunteer Coordinator, 922-9410, ext. 360, for details.

July, August, and September Hours. The Museum opens daily at 9 a.m. and closes (through Sept. 1) at 6 p.m. every day except Friday. Beginning Sept. 2, the Museum will close at 5 p.m. On Fridays the Museum remains open until 9 p.m. throughout the year.

The Museum Library is open weekdays 9 a.m. to 4 p.m. Obtain a pass at reception desk, main floor. Closed Sept. 1 (Labor Day).

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

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Field Museum
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Bulletin

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Founded 1893

President: E. Leland Webber
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COVER
Detail of totem pole of the Gitksan Indians in the village of Kitwankul, British Columbia. Carved about 1900. Photo by Ron Testa, who shot British Columbia totem poles with his Hasselblad 500CM camera during 1977 tour of the region. *See pages 4-9.*

Group Visits for China Treasures

GROUP VISITS for the exhibit "The Great Bronze Age of China: An Exhibition from the People's Republic of China," opening August 20 and closing October 29, may now be arranged for groups as small as 30 persons. During public hours, daily except Friday, special groups of 30 to 120 persons can be accommodated. On Tuesday and Thursday evenings (after the Museum is closed to the general public) groups of 50 or more can be accommodated. Supplemental lectures for such groups, as well as private dining arrangements, are also available. For rates and other information call Caryn Friedman at 786-9570.

FIELD BRIEFS

President Webber Honored

E. Leland Webber (right), Field Museum president, receives congratulations of DePaul University president Rev. John R. Cortelyou, C.M., after accepting honorary Doctor of Humane Letters degree at DePaul's 82nd annual commencement on June 15. Webber was one of four to receive an honorary degree at the ceremony.

Webber's citation noted, "As president and director of one of the few great museums in the world..., you have helped form and implement its philosophy. You envision a museum as a wonderland that can stimulate young and old at their own pace and on their own initiative, and your leadership has ensured that the Field Museum does this superlatively well."

Marianne F. Powers Joins Staff

Marianne Fugiel Powers has joined the Department of Education as the new geology instructor. Her responsibilities include giving programs to visiting school groups, preparing educational materials, and working with Department of Education volunteers.

Mrs. Powers taught intermediate and junior high science for 12 years as well as introductory geology courses at the college level. She holds degrees from De Lourdes College, Des Plaines, IL, and from Notre Dame University.

Admission Fee Increase

Admission fees to Field Museum for non-members have been increased, as of July 1. The new admission rate for individual adults is $2.00, for individual children (ages 6-17) and students with ID $1.00, for families $4.00, for senior citizens 50¢. Admission is free for children under 6, teachers, U.S. military personnel, and Field Museum Members. On Fridays admission is free to all.

Annual membership rates continue at $25.00 for families and $20.00 for individuals.

Volunteer Landow Honored

Carol Landow, a volunteer in the "Place for Wonder," has been named by the Voluntary Action Center of the Comprehensive Community Services of Metropolitan Chicago, Inc. as one of seven Outstanding Volunteers in the Chicago metropolitan area for 1980. The selection was made from more than 150 individuals and groups nominated by Chicago area organizations and human care agencies.

Carol Landow has spent hundreds of hours during the past three years helping to develop and innovate special education programs at Field Museum in the hands-on exhibit, "The Place for Wonder."

Impressive First Season for Hitters

Field Museum's new softball team, the Field Museum Hitters, winds up its initial season with an impressive record. By July's end, the team had garnered nine wins against a single loss. Team members represent the Department of Security and Visitor Services, Housekeeping, and Engineering. Team manager is Gwen Anderson.

Shown here with Field Museum President E. Leland Webber (top, left) are (seated) R. Crawford, F. Bluntson, and N. Glover; (kneeling) E. Holmes, A. Holmes, L. Mister (player/coach), and G. Stlaske; (standing) Webber, D. Raabe, R. Leigh (coach), J. Suffredin, T. Williams, D. Sadowski, P. Poindexter, A. Bluntson, G. Anderson, and W. Grey. Not shown are L. McGraw and E. Jones. Team expenses, including uniforms and equipment, are borne by the players.

TOTEMS of the GITKSAN

Photos by RON TESTA
Field Museum photographer

In August and September of 1977, Field Museum photographer Ron Testa toured the Northwest Coast of Canada to photograph scenes of contemporary Indian life in that region. His material was to be used in the design and development of Hall 10 ("Marine Hunters and Fishers"), scheduled for completion in 1982.

Along the way, Testa also photographed a large number of totem poles, particularly of the Gitksan, a subgroup of the Tsimshian people living along British Columbia's Skeena River. Traveling northeastward from the city of Prince Rupert on Highway 16, known as "Totem Highway," he passed through the Gitksan villages of Gitsegyulka, 'Ksan, Hazelton, Kispiox, Kitwanga, and Kitwankul, where the totems shown on these pages are located.

The most widely known art form of the Northwest Coast Indians, totem poles serve a variety of purposes: as memorials, as grave poles, and as house poles, both interior and exterior. The oldest of those shown here were carved about 1870, the most recent about 1915.

Testa's tour of the Northwest Coast was funded in part by the National Endowment for the Arts (NEA) and the National Endowment for the Humanities (NEH).

CAPTIONS

Left: Detail of memorial pole, Kitwankul.
Page 5: Stand of totem poles at Kispiox.
Page 6: House frontal pole with elongated entranceway, in village of 'Ksan. Animals represented appear to be a wolf and bears; lips originally painted red, eyes painted black.

Page 7, left: Humanoid house post in 'Ksan.
Page 7, right: Detail of totem in Hazelton.
Page 8, left: Detail of totem in Kitwankul. Portion shown here has twelve small humanoid figures encircling the unusual hole. Carved about 1870-90.
Page 8, center: "Pole of the Cormorant," Kitwankul. Topped by a cormorant, the pole also has a bear cub lower down, out of view. Carved 1910-15 and originally painted black and white.
Page 8, right: The name of this Kitwankul pole is "Drifted Aside," or "Drifted to One Side," after the traditional name of an ancestor, represented by the humanoid figure. On his head perches a raven and in his hands he carries a bow.
Page 9: Humanoid house post in 'Ksan.

Above caption material was adapted from descriptive material in *Totem Poles of the Gitksan, Upper Skeena River, British Columbia*, by Marius Barbeau (1929), published by the National Museum of Canada, Ottawa.

Field Museum Tours For Members

Egypt
February 4-21, 1981

Our Egypt tour offers a rare opportunity for in-depth visits to the treasures along the Nile under the leadership of Mrs. Del Nord, doctoral candidate in Egyptology at the University of Chicago, and Dr. David P. Silverman, assistant professor of Egyptology at the University of Pennsylvania and assistant curator of the Egyptian Section at the University Museum. (Dr. Silverman was project director for the "Tut" exhibit at Field Museum in 1977.) This is the second time the Nord-Silverman team has led an Egyptian tour for the Museum.

Our 1981 tour is being cosponsored with the University of Pennsylvania Museum and will be available exclusively to members of the two museums.

The itinerary will include Cairo, Memphis, Sakkara, Aswan / Abu Simbel, Edfu, Esna, Luxor, Thebes, the Valley of the Kings and Queens, Dendereh, Abydos, Amarna, Middle Kingdom tombs at Beni Hasan, the pyramid at Medum, and much more. The tour also includes an 11-day Nile cruise on a chartered, modern Nile steamer, the *Rev Vacances*. The tour price is $3,395 per person based upon double occupancy, plus a $500 donation to Field Museum. The price includes all air transportation, meals, Nile cruise, hotels, tips, taxes, transfers, visa fees, admissions, baggage handling, escorts, and more. Single supplement is available upon request, Nile cruise and land.

Since this tour has already elicited unusual interest and is limited to 30 persons, Members are urged to make reservations as soon as possible. Reservations will be honored in the order received.

10 *Interior of the Great Temple at Abu Simbel*

Baja California
January 30-February 14, 1981

Just 50 miles from our Southwest border begins the richest sea in the world—the Sea of Cortez. It's a body of water 600 miles long and rarely more than 90 miles wide. To the west is the Baja peninsula; an area known to only a few people. Field Museum is pleased to offer its Members an opportunity to explore this area which is rich in marine life, many species of birds, desert vegetation, beautiful beaches and truly magnificent scenery. There will be daily outings in "zodiac" boats for landings and whale watching or birding. We invite you to join us for a 14-day circumnavigation cruise aboard the Lindblad *Pacific Northwest Explorer*, built in the U.S.A. and launched just this year. Our exploration cruise will begin in Puerto Penasco. Of course, one of the most exciting aspects of this journey will be the opportunity to observe the huge gray whales as well as a half dozen other species. The Field Museum lecturer will be Dr. Robert K. Johnson, Head of the Department of Fishes; we will also have along other professional and amateur leaders who will help make the trip more meaningful.

This is the perfect escape from Chicago's winter; and just think, two weeks with no packing and unpacking and no airports to negotiate! We hope the idea excites you as much as it does us. Please write or call for information.

Papua New Guinea
April 30-May 16, 1981

The island of New Guinea, the third largest island in the world, is the major part of the newly independent nation of Papua New Guinea. Although known to Europeans since the 1500s, intensive contact with the industrial Western world began a scant 100 years ago. Some highland areas with large native populations were unknown until the 1930s, when 'discovered' by Australian patrols.

New Guinea abounds in extremes of climate, geography, animal and plant life. There are also fascinating differences amongst the peoples and their cultures. Many still live according to their old ways, while others have modernized; developing cities, universities, hospitals, and industries. Exotic birds and animals still abound everywhere; native peoples still present colorful ceremonies and dances. The variations in language, culture, and art forms which developed over thousands of years of geographical and social isolation are still to be seen. Each province has its own charm and style, whether in the green valleys of the highlands, the coastal lowlands, or along the mighty Sepik River, a monster waterway draining a vast area of grassland and jungle in a serpentine path from the mountains to the sea.

Field Museum can now offer its members a 16-day expedition to New Guinea, including visits with peoples of the highland and coastal regions and a four-day cruise aboard the newly refurbished *Melanesian Explorer*, during which secluded villages of the Sepik River and its tributaries will be visited. Dr. Phillip Lewis, curator of primitive art and

For additional information and reservations for all tours, call or write Dorothy Roder, Field Museum Tours, Roosevelt Rd. at Lake Shore Dr., Chicago, Ill. 60605. Phone (312) 922-9410.

Melanesian ethnology, our Field Museum lecturer, and Jeff Leversidge, a well known authority on the Sepik River, will share with you their knowledge of traditional life and customs of New Guinea peoples.

"Sing Sings" (dances and celebrations) performed by villagers adorned with vivid feather headdresses and with bodies painted in bright colors, will be attended by tour members; there will also be opportunities to buy Sepik art.

Participation in this unique expedition is limited to the capacity of the *Melanesian Explorer*—a maximum of 39 persons.

India
January 21-February 11, 1981

Now is the time to take that long-awaited tour of India—a country that must be experienced to be believed. The Hindu and Buddhist respect for life has, over the centuries, permitted great populations of humans and animals to coexist in often crowded proximity: painted storks calmly fish in a roadside ditch within yards of a man and bullock ploughing; monkeys scamper on a highway jammed with cars, camels, water buffaloes, and bicycles; dozens of iridescent blue-green parakeets shriek defiance from a schoolyard tree; animals vulnerable for their immense size—elephants, rhinoceros, and tigers—still roam the forests.

India also affords breathtaking landscapes: The sheerly rising, snow-peaked Himalayas form a backdrop, unreal in its wall-like abruptness, to the valley of Kathmandu. Ancient temples freeze still living theologies into stone; The eloquent marble geometry of the Taj Mahal, the many-armed dieties of Hinduism, and the serene face of the teaching Buddha form a living link with the past.

And this is a country where travel is still very affordable. Please call or write for further details.

People's Republic of China
April 1-21, 1981

A specially tailored 3-week travel/study tour of China is offered under the leadership of Mr. Phillip Woodruff, an authority on Chinese history and culture. Limited to 25 members, the group will explore the marvels of ancient China and see how cities as well as rural communities have been modernized.

Among the cities to be visited is **Peking**, which retains its 15th-century layout amidst the Imperial Palace buildings. A side trip is planned to the Great Wall. In **Sian**, tucked into a small section of what was China's capital during the T'ang dynasty, we will marvel at the 8th-century calligraphy and carved decor of the famous Memorial Forest of Tables, where Chinese classics are inscribed in stone. The nearby neolithic site of Pan Po will be seen, as well as the spectacular tomb of Emperor Shih Huang-Ti, of the Ch'in (Qin) dynasty. Partial excavation of the tomb has revealed a clay army of 6,000 life-size soldiers, horses, and chariots (some of which are to be seen in "The Great Bronze Age of China" exhibit on view at Field Museum through October 29). Wall paintings in the Li Hsien and Yung T'ai tombs are also scheduled to be seen. A side trip is planned to the **Yunkang Caves**, dating from 460 to 490 A.D., and occupied by Buddha statues of all sizes.

Stanton R. Cook, courtesy *Chicago Tribune*

Monument to the People's Heroes in Peking

Nanking, dating back to the Chou dynasty (8th to 3rd centuries, B.C.), served seven times as capital of regional empires, twice as seat of revolutionary government, and twice as capital of united China. Nature has endowed the city with an abundance of scenic delights, such as the Lake of No Sorrow and the Mystic Martial Lake.

In **Shanghai**, one of China's major ports, is the noteworthy Museum of Art, which houses a large collection of Chinese bronze vessels and exquisite paintings. On the south end of the Grand Canal, **Hangchow** is one of China's most beautiful southeastern cities, steeped in 2,500 years of history. The West Lake mirrors the landscape to form a panorama of beauty. Local handicrafts of silk, embroidery, and glassware will delight the most discriminating shopper.

Kweilin is also well known for its spectacular scenic beauty. The riverbank rises sharply into the hills and crags, forming unusual landscapes which have inspired centuries of traditional painters. Many of the peaks contain exotic limestone caves. **Canton**, southernmost point in our tour itinerary, with a history of over 2,000 years, was China's first city to trade with foreign countries. We will visit memorials of the revolution, such as the former site of the National Institute of the Peasant Movement, the Memorial Hall to Sun Yat-sen, and the Mausoleum of the Seventy-Two Martyrs at Huanghuagang.

Air travel is scheduled via the Pacific route. Although details of the exceptional itinerary are still under negotiation with Peking, Museum members interested in joining the tour should call or write the Tours Office now. As additional information on the tour is available, you will be notified.

Watch for details on the trip to Death Valley (December 1980), to Kenya (Sept-Oct 1981), and to Peru (October 1981). Or, let us know of your interest and we will send you full information on these trips as it becomes available.

OUR ENVIRONMENT

Decomposition Rates for Litter

The *New Hampshire Campground Owners Newsletter* reports the following rates of decomposition for various types of roadside litter. (The identity and qualifications of the estimator were not given.)

- Orange peel: 2 weeks to 5 months
- Plastic-coated paper: 1-5 years
- Plastic bags: 10-20 years
- Plastic film: 20-30 years
- Nylon fabrics: 30-40 years
- Hiking boot soles: 50-80 years
- Aluminum tabs, cans: 80-100 years

Lucrative Skullhunting Reduces Mountain Gorilla Population

Twenty years ago there were 500 mountain gorillas on the Zaire-Rwanda border. Today, primarily because of habitat destruction, numbers are down to about 250. Trade in gorilla skulls has become a lucrative business as they are sought as souvenirs by European tourists, consequently poaching has become a serious problem.

At least 16 gorillas have been killed for their heads since 1976. In 1978 the dominant male of a troop was killed; this may result in the whole troop of animals dying out as younger animals probably have not attained the maturity necessary to hold the group together.

Geese as Guards

Geese, the sentinels that reportedly warned the Romans of encroaching Gauls, are still used as watchdogs. In Dunbarton, Scotland, six dozen white geese guard about 30 million gallons of whiskey, valued at over $900 million dollars. Any intruder is greeted with a fanfare of hissing and honking. The unique security force has been found to be more effective than dogs, people, or mechanical devices.

Norwegian Scheme for Car Recycling

After one year of operation, Norway's "deposit legislation" on privately owned cars seems to be a success. The program requires a $100 deposit on new cars at time of purchase. The money is returned when the auto is scrapped. Based on the "polluters pays" principle, the system has resulted in the recycling of 41,000 autos and vans. A 20 to 25 percent reduction in steel imports by Norway has been one of several benefits.

Kirtland's Warbler Increases in Michigan

The Michigan Department of Natural Resources announced that its 1980 census of the Kirtland's warbler population in Michigan was up 30 pairs from last year's census. The inventory revealed 242 pairs of Kirtland's warblers in the six-county survey.

The Kirtland's warbler, a federally endangered species, is dependent on Michigan's jackpine habitat for nesting. The tiny bird winters in the Bahamas and returns to Michigan each year to nest.

Thomas Sheldrake, an endangered species biologist with the U.S. Fish and Wildlife Service (FWS) in Minneapolis, said that although the 1980 census was good news, the warbler population is still precariously scant in total numbers. "Our cooperative goal for the Kirtland's warbler is 1,000 pairs," he said. "This target population level can only be achieved by increases in the nesting habitat."

Sheldrake said biologists conclude that it will take roughly 36,000 acres of prime nesting habitat to achieve a population of 1,000 pairs. Currently the warbler population in Michigan has around 17,000 acres of nesting habitat. The FWS said the recent Mack Lake fire did not affect the warbler population. The birds simply left the area for other sites when a large scale fire swept through the Mack Lake area.

Hydrocarbons as Air Pollutants

Gasoline prices at the pump are at an all-time high, yet millions of gallons of gasoline literally go up in the air in the Midwest every year.

The loss occurs at gasoline storage and loading terminals, during the loading process. Here's how it happens.

A tank truck pulls into a gasoline distribution terminal and parks next to a gasoline loading rack, which is a platform full of pipes and pumps that transfer gasoline from the storage tank to the truck. A loading arm from the platform is coupled to the truck, and gasoline is then pumped into the truck.

The truck's tank appears to be empty, but actually it's full of hydrocarbon (gasoline) vapors left over from previous loads. The liquid gasoline pumped into the truck displaces those vapors, which escape through the hatch into the air.

Once in the air, hydrocarbons react with nitrogen oxides and sunlight to form ozone, commonly known as smog. Ozone is one of the five major air pollutants for which EPA has established a national health-related standard. If ozone exceeds that standard, it means your health can be adversely affected. Studies show that ozone can impair normal lung functions and cause symptoms such as eye irritation, coughing, choking, headache, and severe fatigue. Besides helping to form ozone, escaping hydrocarbons represent gasoline that is lost forever.

There are three basic loading methods used at gasoline terminals: splash loading (from the top of the truck), submerged top-fill loading (with load pipe extended to 18 inches of truck bottom), and submerged bottom-till loading. Submerged loading (top- and bottom-fill) reduces gasoline vapor loss by 58 percent when compared to splash loading, but neither method is approved by EPA as the answer to hydrocarbon pollution control The installation of vapor recovery and control equipment is the only sure method, EPA emphasizes.

If vapor recovery systems were installed and operating properly at all gasoline loading facilities cited for violations to date, EPA estimates that oil companies in Illinois could recapture 4.2 million gallons of gasoline per year.

(Continued on page 25)

Third Annual Festival Of Anthropology on Film

FIELD MUSEUM OF NATURAL HISTORY

west entrance

Saturday, September 27, 10 a.m. to 5 p.m.
Sunday, September 28, from 10 a.m. to 5 p.m.

FIELD MUSEUM INVITES YOU to join in the *Third Annual Festival of Anthropology on Film*, a fascinating opportunity to explore the cultures of the world on film. We are especially pleased to have Jean Rouch, the illustrious French documentary filmmaker, as our keynote speaker. He brings many films from Paris that document ritual and possession among the peoples of Africa.

The Festival consists of 50 films grouped by eight subject areas: I. Rituals; II. Work, Survival and Self-Expression; III. Cultures and Change; IV. Archeology and Lithic Technology; V. World Music and Dance; VI. Men and Women; VII. Possession and Healing; and VIII. Humor, Irony, and Parody.

In addition to selected works of Rouch, Festival highlights include Robert Gardner's new work *Deep Hearts*, David and Judith MacDougall's *The Wedding Camels* and *Lorang's Way*, Maya Deren's *Divine Horsemen: The Living Gods of Haiti*—a rarely seen film on the Voudoun religion of Haiti, and *Some Women of Marrakesh* by Melissa L. Davies.

The films are shown by subject area in James Simpson Theatre, Lecture Hall I, A. Montgomery Ward Hall, and Classroom V. Selected films will be screened a second time according to culture in Lecture Hall II. The Festival Schedule is subject to change. Please use the attached coupon to order your tickets. A film schedule will accompany the tickets mailed to you. Complete "Film Notes" are available at the Festival. Call (312) 322-8854 for details.

Saturday, Sept. 27

10:00 a.m.—5:00 p.m.
James Simpson Theatre
Introduction by Paul Hockings, Associate Professor of Anthropology, University of Illinois, Chicago Circle Campus.

I. RITUALS

The Eleven Powers (1978) 48 min
LARRY CARTENSTEIN
Once in 100 years in Bali, a sacred festival restores the balance between good and evil. Orson Welles narrates this dramatic film.

Saints and Spirits (1979) 45 min.
ELIZABETH FERNEA
This film seeks to explore the personal dimension of Islam during three events in Morocco, all seen through the experience of one woman.

Via Dolorosa (1978) 10 min
GEORGES PAVLOVITCH AND CLAUDINE VIALLON
During the "Passion of Christ" ceremony in Antigua, Guatemala, the people decorate the streets and take turns carrying the crucifix along "The Painful Way."

Sigui Bongo (1969), *Sigui Amani* (1970)
JEAN ROUCH
Once every 60 years, the Dogon of Mali celebrate the ceremonies of Sigui, which take place over a period of 7 years. Jean Rouch made 7 films to document the festival; two will be shown.

Funerailles a Bongo—Anai Dolo 1948-1970 (1972) 90 min
JEAN ROUCH
Filmed over a period of years, this film documents the rituals before, during and after the death of a religious leader of the Bongo tribe in West Africa, a well loved man who was over 120 years old.

Ambara Dama (1974) 90 min
JEAN ROUCH
The society of masks of Sanga (Mali) organizes a "Dama" in which the old masks are replaced by new ones. The dance of the masks is vividly portrayed.

1:00 p.m. "Ritual and Possession Among the Dogon"
Keynote address by Jean Rouch, director of research, Centre National de la Récherche Scientifique, and instructor, Musée de l'Homme, Paris.

A world renowned leader in visual anthropology, Rouch began making films in West Africa in 1946. He has made more than 75 films, many documenting rituals and ceremonies in African villages. His films of possession rituals have pioneered a personal, interactive style of filmmaking which uses portable sync-sound equipment to its greatest potential. A captivating speaker, he is a master at communicating infectious enthusiasm for his subject. You have a rare opportunity to hear one of the most important figures in filmmaking history.

10:00 a.m.—1:00 p.m.
Lecture Hall I, A. Montgomery Ward Hall

II. WORK: SURVIVAL AND SELF-EXPRESSION

The New Opium Route (1973) 54 min
CATHERINE AND MARIANNE LAMOUR
A story of the Pashtus who have lived for centuries in the Khyber Pass. Focuses on daily lives of the farmers who grow and harvest the poppies. Follows the opium route to European processors and to the American market.

Alice Elliot 10 min
Shows the handiwork of Pomo basketmaker Alice Elliott, a gifted artist whose baskets preserve the dying tradition of her people.

At the Time of Whaling (1974) 38 min
LEONARD KAMERLING AND SARAH ELDER
A film from the Alaska Native Heritage Series about the traditional and contemporary culture of Eskimo people. Produced by the community in their local language. English subtitles.

Farm Song 1978 57 min
JOHN NATHAN for Hawaii Educational Television
An extraordinarily beautiful and intimate film. Four generations of a rural Japanese family speak frankly about their backbreaking work, their relationships with one another, and the seasonal celebrations that enliven their world.

Traditional Handicrafts 16 mm
JORIS IVENS
A short, lyrical film about the myths and crafts of the Chinese people, their workmanship, and how these traditions have been passed down through generations.

The Cost of Cotton 30 min
A powerful documentary on the effects of the international demand for cotton on a developing nation. Examines the effect of pesticides on the environment and health of the Quiché Indians, Guatemala's cotton workers.

Oaksie 1980 22 min
ANTHONY STONE
A sensitive portrait of a basketmaker, fiddler, and harp player from Cowan Creek, Kentucky.

The Painted Truck 28 min
JUDITH AND STANLEY HALLET AND SEBASTIAN C. SCHROEDER
There are but two methods of transportation in Afghanistan—camels and trucks—and the big trucks are taking over. This truck driver tells what it is like to live and work in Afghanistan and reveals much about the social structure, traditions, and culture of his country.

1:30 p.m.—5:00 p.m.
Lecture Hall I (A. Montgomery Ward Hall)

III. CULTURES AND CHANGE

The Turtle People 26 min
The coastal Miskito Indians of eastern Nicaragua have depended on the green sea turtle for over 350 years. The Miskito have entered the market economy and now pursue the turtles not for food, but for cash.

Listen Caracas 19 min
CARLOS AZPURUA
A forceful statement from the Indians of the Amazon region on the white man's continuing attacks on their culture.

Indians and Chiefs 1972 40 min
JUDITH AND DAVID MACDOUGALL
A film about American Indians trying to maintain their Indian identity while learning to master the white man's world, on his terms.

Jama Masjid Street Journal (1979) 20 min.
MIRA NAIR
A personal record of street life in the Moslem community that centers itself around the Jama Masjid, or the Great Mosque, in the old city of Delhi.

10:00 a.m.—1:00 p.m.
Classroom A

IV. ARCHEOLOGY AND LITHIC TECHNOLOGY

4 Butte-1: A Lesson in Archaeology 1968 33 min
DONALD MILLER, TONY GORSLINE, JAMES R. SACKETT

Meadowcroft Rockshelter: A Question of Questions 30 min.
J. STEPHEN FAIRCHILD, JAMES ADOVASIO AND J. D. GUNN

Archaeology in Mesopotamia (1964) (1964) 16 min.

Excavations at La Venta 1963 29 min.
ROBERT F. HEIZER

Early Stone Tools (1967) 20 min.
FRANÇOIS BORDES

Gum Preparation, Stone Flaking: Dyagumara Leaves Badjus 19 min

Spear Making: Boys' Spear Fight 10 min

Sinew-backed Bow and Its Arrows 1961 24 min.
SAMUEL A. BARRETT

1:30 p.m.—5:00 p.m.
Classroom V

(V) WORLD MUSIC AND DANCE

Learning to Dance in Bali (20 min.
GREGORY BATESON
I Mario is shown teaching basic arm and other dance movements in the village of Tavanan. A study of visual and kinesthetic learning.

Tailler Le Bambou (1978) (20 min.
HUGO ZEMP
The making of pan flutes among the Are'Are people of the Solomon Islands.

Behind the Scenes at the Peking Circus (16 min.
JORIS IVENS
A backstage view of the internationally acclaimed Peking Circus as performers rehearse a wide variety of talents.

No Maps on My Taps (1979) (58 min.
GEORGE T. NIERENBERG
A unique insight into jazz tap dancing as a neglected black American art form.

Batteries Dogon (10 min.
JEAN ROUCH
Music and dance among the Dogon people of Mali.

Sunday, Sept. 28

10:00 a.m.—5:00 p.m.
James Simpson Theatre

(VI) MEN AND WOMEN

Some Women of Marrakesh (1978) (52 min.
MELISSA LLEWELYN DAVIES
Filmed in the homes in the old city of Marrakesh, Morocco, the film tells the story of Aisha bint Muhammed and her friends. The crew accompanies them in their worship, at parties, and at a Muslim wedding.

Rana (18 min.
BRUCE MOIR AND DEBBY KINGSLAND
A moving and insightful portrait of a Muslim girl living in Old Delhi.

Lorang's Way (1978) (70 min.
DAVID AND JUDITH MACDOUGALL
The second film in the new "Turkana Conversations" trilogy. A fascinating portrait of Lorang, head of a large household in Kenya. It is a study of a man who has come to see his society as vulnerable—and explore his personality through his conversations with the filmmakers, the testimony of friends, and observation of his behavior with his wives, children, and men of his own age and status.

The Wedding Camels (1978) (108 min.
DAVID AND JUDITH MACDOUGALL
A narrative documentary about the Turkana, semi-nomadic herders who live a traditional life in an isolated region in northwestern Kenya. A young girl's wedding to an old friend of her father should go smoothly, but under the pressures of both families' demands things almost fall apart. From the "Turkana Conversations" trilogy.

Deep Hearts (1980) (53 min.
ROBERT GARDNER
A beautiful film about the Bororo Fulani people of the Niger Republic of Africa. These nomadic people of the Sahel gather during the rainy season to celebrate their independence and beauty through ritual dance. At the gathering, they hold a series of dances known as "Berewol" in which the younger men compete in the context of beauty "Deep hearts" is their description of how they must live. For them, it is necessary to hide the feelings of envy which they all experience, and they do this by cultivating a deep and secret heart.

10:00 a.m.—1:00 p.m.
Lecture Hall I (A. Mongomery Ward Hall)

(III) CULTURES AND CHANGE

Qeros: The Shape of Survival (1978) (53 min.
JOHN COHEN
A document of Peruvian Indians in the region of Qeros at 14,000 feet in the Andes. The film examines their complex pattern of survival in this harsh environment.

Communists for 1,000 Years (43 min.
GORDIANN TROELLER AND MARIE CLAUD DEFFARGE
An investigation into the beliefs and customs of the ancient Carmathian sect in South Yemen. In the midst of the Islamic world, they have practiced Communism for 1,000 years and believe in the equality of women and atheism.

The Ona People: Life and Death in Tierra del Fuego (1968) (55 min.
ANNE CHAPMAN AND ANA MONTES DE GONZALEZ
The story of the Ona People (Selk'nam)—their culture and kin, and how both were destroyed.

Jean Rouch

1:00 p.m.—5:00 p.m.
Lecture Hall I (A. Montgomery Ward Hall)

(VII) POSSESSION AND HEALING

Les Tambours d'Avant: Tourou et Bitti (1971) (10 min.
JEAN ROUCH
In one continuous take, Rouch captured the climax of a possession dance at Simiri in Niger. One of the best examples of Rouch's provocative film technique.

A Balinese Trance and Dance Seance (1978) (30 min.
TIMOTHY ASCH, LINDA CONNOR AND PATSY ASCH
Documents the work of Jero Tapakan, a woman of Central Bali who is esteemed for her ability to contact the many deities and spirits through seances. Petitioners come from far away to seek answers from the spirits through the medium.

Divine Horsemen: The Living Gods of Haiti (1947-1951) (54 min.
MAYA DEREN
Maya Deren, who had been initiated as a priestess of the Voudoun religion of Haiti, documented in intimate detail some rituals of the Rada, Petro, and Congo cults of Haiti. After her death this film was edited by Cherel and Teiji Ito.

Rich Man's Medicine, Poor Man's Medicine (1976) (43 min.
GORDIANN TROELLER AND MARIE CLAUD DEFFARGE
Contrasts the modern medical practices in the cities of West Africa with the traditional approach to healing in the hinterlands.

Noel Natels (30 min.
MARCUS ALTBERG
Tells the story of a German physician who spent his life working in the Brazilian jungles, particularly with the native Indians. In addition the film documents the problems created by the encroachment of white civilization.

Eduardo Curandero (1978) (55 min.
RICHARD COWAN
Eduardo is a self-styled healer in Peru who uses hallucinogenic drugs to practice his healing art. "A moving and memorable documentary portrait of a man of exceptional character."

10:00 a.m.—5:00 p.m.
Classroom A

VIII) HUMOR, IRONY, AND PARODY

L.A.I.A. Making it in L.A. 1979 58 min.
CAROLINE AND FRANK MORRIS
A documentary essay focusing on the search for show business fame and fortune in the Los Angeles entertainment industry. Features fifty-five aspiring actors, musicians, and comedians who speak about their lives, dreams, and disappointments.

Murita Cycles 1979 28 min.
BARRY BRAVERMAN
A run-down bicycle shop on Staten Island is owned by Murray Braverman, an abrasive philosopher punk collector bike repairman. The film is by his son. This candid portrait uses humor and sensitivity in an attempt by a son to understand his father.

Cocorico! Monsieur Poulet 1974 90 min.
DAMOURE LAM ROUCH
Fictional tale of the adventures of three friends who sell chickens in the countryside of Niger with the help of an old car.

Hush Hoggies Hush: Tom Johnson's Praying Pigs 1979 4 min.
BILL FERRIS AND JUDY REISER
For 35 out of the last 37 years, Tom Johnson of Betonia, Mississippi, has trained litters of pigs to "pray" before they eat from their trough. As the film documents this process, Johnson comments, "Most everybody I know is amazed to see this."

Petit à Petit 90 min.
JEAN ROUCH
A fictional tale which points out with charm and humor the possible conflicts of Western and traditional ways as Africa begins industrialization. An import-export firm called Petit à Petit, set up by the three friends who starred in Rouch's famous film *Jaguar*, grows into a huge conglomerate as the founders' greed and accumulation of European ways gets more and more out of hand and out of touch with their own heritage. Includes a marvelous parody of anthropological studies as the friends travel to France to learn about skyscrapers.

Gino's Pizza 18 min.
Warren Bass
A cinéma vérité documentary, a comedy, a character study, and a social comment on the way people look at themselves and their successes. It is both hilarious and touching.

A Night in the Art Gallery 18 min
A charming animation from the People's Republic of China satirizes the Cultural Revolution.

CREDITS: Our special thanks to the following film distributors for their generosity in extending courtesy film loans to the Third Annual Festival on Anthropology on Film: Audio Brandon Films, Brookfield, IL; Direct Cinema, Ltd., Los Angeles, CA; Documentary Educational Resources, Watertown, MA; Film Australia, New York, NY; Icarus Films, New York, NY; Institute for Study of Human Issues, Philadelphia, PA; Japan Society Films, New York, NY; New York University Film Library, New York, NY; The Pennsylvania State Audio-visual Service, University Park, PA; Phoenix Films, Inc., New York, NY; Serious Business Company, Oakland, CA; Unifilm, New York, NY; University of California Extension Media Center, Berkeley, CA; University of Illinois, Chicago Circle Campus, Chicago, IL.

Third Annual Festival of Anthropology on Film
September 27 and 28 1980

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COCA

High in nutritional value as well as alkaloids—notably cocaine—the coca leaf is the focus of an international debate by anthropologists, health officials, and lawmakers

By TIMOTHY PLOWMAN

COCA is one of the most important plants in the history, religion, medicine, and daily life of South American Indians. It is also one of the oldest New World cultivated plants, the origin and domestication of which is only now coming to light. (Coca is not to be confused with the cocoa, or cacao, plant, the seeds of which are the source of chocolate.) The leaves are the part of special interest to man, and these are derived from two species of shrubs of the genus *Erythroxylum*. Bolivian, or Huánuco, coca (*E. coca*), is native to the moist forests of the eastern slopes of the Andes. An important variety of *E. coca* (var. *ipadu*) is cultivated in the lowlands of the Amazon basin. The second species, known as Colombian coca (*E. novogranatense*), is grown in drier areas of Colombia and along the Caribbean coast of Venezuela. *E. novogranatense* also has a major variety, which is known as Trujillo coca (var. *truxillense*). This variety is cultivated on the desert coast of northern Peru near the city of Trujillo and is much sought after for its rich flavor.

The chewing of coca leaves is an integral characteristic of most Andean cultures, where even today the use of coca pervades all aspects of Indian life. The sole source of the alkaloid cocaine, which in recent years has become a major recreational drug in Western societies, coca is the focus of increasing international debate by government officials and law enforcement agencies preoccupied with controlling illegal drug traffic.

The history of coca, long and complex, is still not well understood. Archeological finds along the coast of Ecuador date the use of coca to as early as 3000 B.C., and its early domestication certainly goes back much further. Numerous ceramic and metal artifacts associated with coca chewing have turned up in sites from Costa Rica south to Chile, indicating the widespread diffusion of coca chewing in pre-Columbian times. Intact, preserved coca leaves dating back to 1300 B.C. have been recovered from preceramic sites on the desert coast of Peru. There is every reason to assume that coca was used in most if not all of the highly developed civilizations of the Andean region.

On the basis of archeological evidence, it appears that in early Andean cultures coca was fre-

Flowering branch of Trujillo coca (Erythroxylum novogranatense *var.* truxillense) *cultivated near Trujillo, Peru.*

Timothy Plowman is assistant curator of botany.

quently used by priests and shamans for religious and healing purposes. Many figurines and painted ceramics suggest that some coca chewers were members of high-ranking noble or priestly castes. In Colombia, archeologists have found elaborate gold vessels used to hold the powdered lime taken with coca; these containers were worn as ornaments by priests and noblemen. Coca was certainly one of the most important elements in the native materia medica, used not only as a stimulant but also to treat a broad range of illnesses. It has been suggested that coca was used in ancient Peru as a local anesthetic for trephination (cutting a hole through the skull) and other surgical operations. The Andean Indian today employs coca as a common household remedy in continuation of an ancient medical tradition.

When the first Europeans arrived in Central and South America, they encountered coca in extensive use among completely unrelated indigenous groups. After the Conquest, the Spaniards condemned the use of coca and attempted to repress its cultivation. Ecclesiastical authorities were especially vehement in attempting to eradicate coca chewing, which they considered a form of idolatry. Later, when the conquerors realized how important coca was for the highland Indians, especially for working in the gold and silver mines, they ceased their persecutions and eventually took control of coca production and distribution. In the 17th and 18th centuries, both the viceroyalty of Peru and the Church collected enormous revenues from taxes levied on the coca trade. Indian laborers were often paid in coca leaves, which today remain an important means of exchange in highland communities. It was mainly after the Spanish Conquest that coca became secularized and made widely available to the general populace as a daily stimulant.

Top photo: *Colombian coca* (Erythroxylum novogranatense), *planted on a farm near Mocoa, Colombia. Photo by the author.*

Bottom: *Picking Amazonian coca* (Erythroxylum coca *var.* ipadu). *Photo by R. E. Schultes.*

Ethnopharmacology

The use of coca leaves as a general stimulant and tonic has changed little since pre-Columbian times. The dried leaves are placed in the mouth, moistened with saliva, and formed into a quid with the tongue, to which is applied an alkaline substance in the form of lime, powdered seashells, or plant ashes. The quid is not actually chewed but allowed to remain in the mouth and sucked, as the alkaloids and other constituents are slowly assimilated. The quid is spat out after about an hour. The only major variation in coca chewing is found in the western Amazon basin, where the leaves are toasted, finely pulverized, and mixed with ashes. This powder is similarly kept as a quid in the mouth; after gradually dissolving, it is swallowed completely.

Coca chewing produces a broad spectrum of physiological effects. Owing to the cocaine content, there is a mild stimulation of the central nervous system and a slight anesthesia in the mouth. Coca suppresses sensations of hunger, thirst, cold, and fatigue, enabling coca-chewing Indians to walk long distances through the mountains and jungles with only coca for sustenance. Coca also produces a state of euphoria, which is said to

ameliorate the arduous life in the Andean highlands. In the words of the Incan chronicler Garcilaso de la Vega (1609), "coca satisfies the hungry, gives new strength to the weary and exhausted, and makes the unhappy forget their sorrows."

In native medicine, coca is often taken as a tea or chewed as a quid for stomachaches and intestinal disorders. It is considered the remedy *par excellence* for *soroche*, or altitude sickness. The leaves are also widely used in poultices for wounds and skin infections. Their anesthetic properties provide the most readily available remedy for toothaches and muscular pains.

The chemical constituents of the coca leaf have never been fully elucidated, a surprising fact in view of its longstanding role in folk medicine and the importance of cocaine in Western medicine. However, some fifteen alkaloids have been identified in the coca leaf, of which the most important is cocaine. Dried coca leaves contain between 0.2 and 1.0 percent cocaine, with an average content of about 0.5 percent. Although cocaine represents about 80 percent of the total alkaloid content of the leaf, it should not be considered the only active constituent. Earlier workers attempted to point out the differences in pharmacological effects between coca leaf and pure cocaine and emphasized the role of the minor alkaloids in the body's total response to coca chewing. This difference has recently been reiterated by modern researchers in the chemistry and ethnology of coca chewing, but still virtually no research has been done on the minor alkaloids or other constituents of coca leaf.

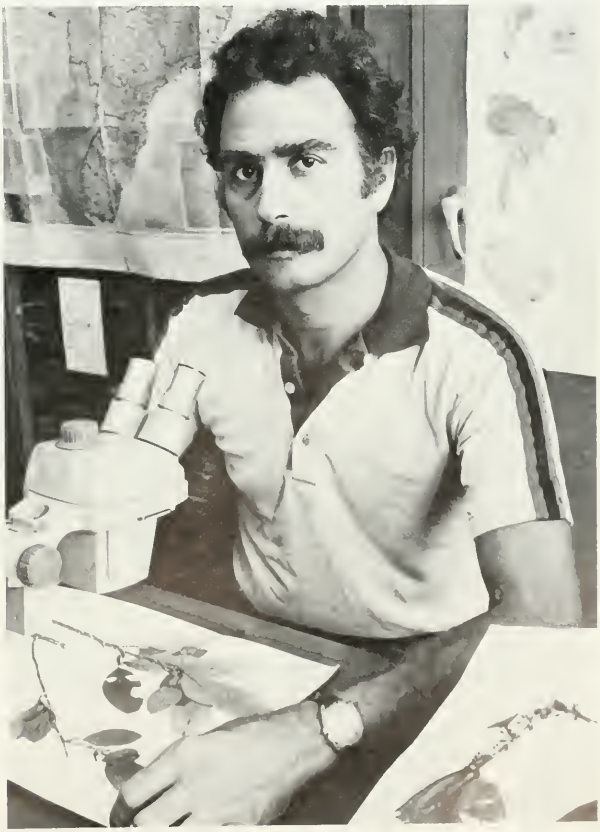
Recent studies have shown that coca contains substantial amounts of certain vitamins and minerals.* For example, ingestion of 100 grams of Bolivian coca leaves would more than satisfy the daily R.D.A. (Recommended Dietary Allowance) for calcium, iron, phosphorus, vitamin A, vitamin B_2, and vitamin E. Since coca chewers may consume up to 60 grams of coca per day, there can be no doubt that coca contributes substantially to the impoverished diet of the Andean coca user.

Coca leaves also contain complex mixtures of flavoring compounds, such as methyl salicylate (wintergreen oil). It is for these constituents that coca leaves have long been used in the beverage industry. At the turn of the century, a number of medicinal coca wines became extremely popular as patent medicines. Decocainized extracts of Trujillo coca leaves are used today in the manufacture of the ubiquitous Coca-Cola®.

Modern investigations of the pharmacological and psychological effects of coca chewing are scant. Studies by two Peruvian physicians, Gutiérrez-Noriega and Zapata-Ortiz, made during the 1940s, were extensive but largely inconclusive and unsubstantiated, dedicated as they were to the abolition of coca chewing. The body develops no tolerance to the effects of coca chewing, even with regular, daily use. Nor is there the appearance of any withdrawal symptoms when coca use is discontinued. In this respect, the effects of coca differ markedly from those produced by the unrelated opium derivatives. In Peru, coca chewers easily drop their habit when inducted into the army or when they move to large cities where coca chewing is considered socially unacceptable. There is, in fact, no conclusive evidence that the daily use of coca leaf in moderate amounts produces any deleterious acute or chronic effects.

The Coca Controversy

The specter of coca as a debilitating vice and source of social degradation has not been corroborated by



Dr. Timothy Plowman, whose interest in the coca plant has involved several years' research and field work, is shown here with dried coca specimens from the Museum's herbarium.

See also "Nutritional Value of Coca," by James A. Duke, David Aulik, and Timothy Plowman, Botanical Museum Leaflets, Vol. 24, No. 6, Harvard University (1975). A copy of this 7-page booklet may be obtained, without charge, by writing the editor of the Bulletin.

objective studies. The fact that many coca chewers are illiterate and poverty-stricken is attributable to a number of complex social, racial, and economic problems widespread in rural areas of Peru and Bolivia. The abuse of alcohol by native Andeans is a far more serious drug problem, and alcohol, unlike coca, directly contributes to poor health conditions, crime, and the cycle of poverty.

Repeated attempts since the 16th century to eradicate coca, usually on moral or religious grounds, have consistently failed in Colombia, Peru, and Bolivia. Anthropologists, nutritionists, and cultural ecologists, as well as other scientists who have had direct contact with living conditions in the high Andes, are becoming increasingly aware of the integral part which coca has played and continues to play in man's adapting to life in the Andean environment.

Coca today offers major problems as well as possibilities for Western society. As the sole source of cocaine, illegal coca production has become the focus of much controversy and attention by international drug enforcement agencies and lawmakers. Heavy pressure continues to be exerted on the governments of Peru and Bolivia, the major producers of coca, to limit or reduce their annual crops. The Peruvian government now officially requires the registration of all coca growers and vendors and has prohibited the establishment of any new coca plantations. These regulations have had little effect, however, except in the most accessible areas of production, particularly on the Pacific coast. In remote jungle areas of the *montaña* on the eastern slopes of the Andes, where most of the coca is grown, there has been little if any effective control. On the contrary, in response to the rising demand and higher prices, coca production has steadily increased in the last ten years.

Poster advertising the French tonic wine Coca des Incas, which was based on an extract of coca leaves (1896). Collection of the author.

In Peru and Bolivia, attempts have been made to find an alternative cash crop for coca farmers. This effort has also met with failure, since no crop has yet been found that can command a guaranteed high price, yet has the superlative adaptation of coca to the unique, mountainous environment of the eastern Andes. In terms of local economies, there simply is no other crop which can

realistically provide the small-scale farmer with such a profitable cash return for his product as can coca. Furthermore, an appreciable and legal internal market for coca leaf continues to thrive in Peru and Bolivia, both for chewing by the native population and for the legal production of pharmaceutical cocaine.

The recent significant increase in cocaine consumption in the United States and western Europe has caused great alarm among government officials. The abuse potential of cocaine is very much greater than that of coca, and cocaine abuse has been demonstrated to cause problems of psychological dependence and other disorders. There is no doubt that attempts to control the abuse of such a potentially harmful drug must be made, but it is impractical to impose the burden of drug control on the Andean peasants, who have had no history of cocaine abuse.

The Role of Coca in Modern Medicine

The medicinal use of cocaine is now limited to topical anesthesia in certain surgical operations. On the other hand, the usefulness of coca leaf in modern therapeutics has scarcely been explored. In the latter part of the 19th century, many physicians in Europe and the United States were prescribing coca leaf preparations for a variety of complaints. But after the pure alkaloid cocaine was isolated and became available to physicians, the natural preparations of the leaf were soon neglected in favor of the more potent, and more easily ingested pure drug. Adverse reactions to excessive use of cocaine were soon recognized by the medical community and the press, which led to the demise of cocaine and its ultimate ban under the Harrison Act of 1914 as a nonprescription, recreational drug. Unfortunately, coca leaves were also included in this ban, which rendered them completely unavailable to physicians and researchers alike for the next half century.

Today there is widespread renewed interest in natural therapeutic agents, including the natural extracts of coca leaf. Coca has been recommended by some medical researchers for a variety of disorders, especially in cases where stronger, synthetic drugs are contraindicated. Coca, according to investigators, may prove to be of value in treating chronic indigestion and spasm in the gastrointestinal tract, as an antidepressant in cases where a mild, nonaddicting stimulant is indicated, for altitude and motion sickness, and as a safe stimulant for persons dependent on stronger, more harmful stimulants such as amphetamines and cocaine. In short, say these investigators, coca offers therapeutic potential as a safe, effective remedy, providing a combination of desirable effects not found in our panorama of synthetic pharmaceuticals. □

Turn-of-the-century Coca des Incas poster. Collection of the author.

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LEARNING MUSEUM CONTINUES WITH:

Animals in Human Perspective

by ANTHONY PFEIFFER
Project Coordinator

Made possible by a grant from the National Endowment for the Humanities, a federal agency

An African hunter combines bird mimicry and stealth to approach within range of his prey. Such abilities illustrate the human facility at manipulating animals, even with relatively simple technology.

Every child imagines meeting Jaws at the beach, as do many adults. Who thinks of dogs without Lassie or Rin-Tin-Tin coming to mind? And who imagines jungles without Tarzan, mice without Mickey, rats without Willard, cats without Morris, whales without Moby Dick, and monsters without the Creature from the Black Lagoon, Godzilla, and the bar scene from "Star Wars"? Films represent our favorite ideas about the animal kingdom.

ANIMALS IN HUMAN PERSPECTIVE examines segments from some of the most popular animal films and TV shows of all time. All the animals portrayed in the films and TV shows have one thing in common—none of them actually exist. In one way or another they are distorted, exaggerated, or just plain made up. We like to think of animals as dangerous or devoted, adorably cute, or horridly brutal. And we transform them into images of ourselves or into alien creatures. Collectively these images, whether of Lassie or of Jaws, speak of a human animal that is out of touch with the rest of the animal kingdom.

Imagine a male chimpanzee as he is. He is not at all like King Kong, Tarzan's ape friend Cheetah, or the juveniles you see cavorting on TV. Nor is he a profound mind trapped in a hairy body. He weighs about 100 pounds, is intent on making a living, and we have only teasing glimp-

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NEH Learning Museum at Field Museum

The NEH Learning Museum program is a three-year sequence of learning opportunities focused on the Museum's outstanding exhibits and collections and designed to give participants an opportunity to explore a subject in depth. Each unit of study consists of one or more special events, a lecture course, and a seminar for advanced work. Special events are lectures by renowned authorities or interpretive performances and demonstrations. Course members receive an annotated bibliography, a specially developed guide to pertinent museum exhibits, study notes for related special events, and access to select materials from Field Museum's excellent research library. In-depth, small group seminars allow more direct contact with faculty and Museum collections.

Animals were a predominant theme in the earliest human art. From about 30,000 to 12,000 years ago, people expressed their fascination for animals on cave walls throughout Southern France and Northern Spain. The art may have been part of ritual hunting magic or initiation ceremonies. Shown here is a portion of one of the dioramas in Hall C, Hall of the Stone Age of the Old World.

ses of how he sees the world. These glimpses are enough to tell us that he is not at all as we usually see him.

The way we see animals mirrors our daily experience of them. We know them as food, but typically the animals are cut up to look nothing like themselves. We know them as domesticates, the products of thousands of years of selective breeding. As for other animals—the vast majority of the animal kingdom—our day-to-day lives do not include them. We see them as things to kill or as things that kill us. We see them as ludicrous caricatures of ourselves. We see them in thousands of far-fetched and colorful ways. In short, we make them into myths.

Myths about animals are powerful and seductive. They inspire us to go to Africa in search of danger and adventure or, more philosophically, in search of our primal selves. We go to zoos and to sea world shows by the millions. And we pack the theaters or sit glued to our TV sets to be terrified, amused, or sentimental about animals. The way we see animals says a lot about ourselves, and the origins of our perceptions go back a long way.

The Bible and evolutionary theory both presume a time when humans were more in tune with the animal kingdom. Adam and Eve are always shown among other innocent beasts in the Garden of Eden before they fell from Grace. Evolutionary theory tells us that the great divide between people and other creatures was a cerebral Rubicon; a time, perhaps two million years ago, when human brains totally outclassed the others. The latest evolution hypothesis goes on to suggest that these early human ancestors were not the intrepid hunters they are often alleged to be. Rather, through long-distance travel and unparalleled wit, they managed to thrive by collecting plants and by scavenging from the kills of the great predators. Large brains nonetheless ultimately became the vehicle by which the human-to-animal relationship was totally altered and continues to change.

Braininess endowed humans with the unprecedented capacity for abstract thought. This capacity, in turn, allowed people to manipulate other animals, to confront them indirectly as opposed to head-on. A lion kills with fang and claw but humans lack these body parts so they make spears. Spears and clubs were innovations early in the game. Thousands of years later people used fire, built traps, and drove animals off cliffs to become more effective killers with

less risk to themselves. Still later, they tamed animals—quite literally changing the natures of the beasts to serve human needs. Most recently, genetic engineering has raised the distinct possibility of creating animals from scratch. Human mastery and domination of the animal kingdom has become so complete that the prospect of fashioning our own kingdom, instead of protecting the remnants of the one from which we emerged, is no longer science fiction.

Such power suggests responsibility. Is it possible to preserve other animals?—and, once preserved, what have these animals become? Is Jaws still a shark, Willard still a rat, Mickey still a mouse, or Elsa still a lion? Is an African wildlife preserve simply a San Diego Zoo several times over? When we protect an animal species—ostensibly to preserve a natural heritage—what has been saved and what has been irrevocably lost? The endangered whooping crane, for example, lives as such in its wildlife refuge but breeds, matures, and dies in artificial circumstances. As an organism, it survives. As a representative of a way of life, it is virtually extinct.

ANIMALS IN HUMAN PERSPECTIVE explores popular myths of animals as reflected in films and TV shows. It is as much an exploration of human nature as it is an investigation of animals. The journey begins Thursday evening, October 16, and runs six consecutive Thursdays through November 20. Each class meeting consists of approximately one hour of film viewing and one hour for lecture and discussion. "Planet of the Apes" is screened in its entirety and analyzed by an expert panel of discussants during the last class session. Registration details appear in the Fall, 1980, *Courses for Adults* brochure.

A related special event is "Human Uniqueness and Animal Nature" on Friday, October 17, at 8:00 p.m. in James Simpson Theatre. This lecture is presented by Stephen Jay Gould. One of the world's most versatile scientists, Professor Gould holds appointments in geology, comparative zoology, biology, and the history of science at Harvard University. Equally respected as a commentator on science and scientific controversy, he is perhaps most widely known for his *Natural History* magazine essays on evolution. These appear there under the general heading "This View of Life," and many were published as a collection, *Ever Since Darwin: Reflections in Natural History*, in 1977. Dr. Gould's lecture challenges the accepted barriers between humankind and nature and explores why the Western world has yet to make its peace with Darwin and evolutionary theory. Registration details for this distinguished lecture appear in the October *Calendar of Events*.

Participants in the ANIMALS IN HUMAN PERSPECTIVE course have the opportunity to enroll in an intensive seminar which explores human control over other animals. Using the same film and lecture format as the course, the seminar focuses on the roles and future of zoos, controversy surrounding the use of animals in experiments, animals as pets, animals as used for human entertainment, so-called "wild" animals, and the future of animals in a world dominated by humans. Each of these issues is explored with the help of expert commentators. In the first seminar session, for example, the Nova film "Memories from Eden" is discussed with the directors of the Lincoln Park and Brookfield zoos. The seminar is open to course participants only. □

Bushman women of the Kalahari Desert use ostrich eggs to store water. People have long depended on animal parts and products for survival. Some of the earliest weapons, for example, are thought to have been animal bones. This theory is reflected in the opening scene of the film 2001: A Space Odyssey.

Continued from p. 12

Midwinter Bald Eagle Survey On Upper Mississippi

The wintering population of bald eagles along the Upper Mississippi River appears to be stable, according to recently tabulated results of the Midwinter Bald Eagle Survey conducted by Eagle Valley Environmentalists (EVE) on February 2 and 3, 1980. EVE's survey is a continuation of the midwinter counts run for nearly two decades by Elton Fawks, of East Moline, Illinois.

EVE's two-day count tallied 875 bald eagles along the Mississippi River between Minneapolis-St. Paul, and Cairo, Illinois. 649 of the birds were adults, 198 were immatures, and 28 were not classified. These figures compare to 922 bald eagles counted in the 19-day survey sponsored by the National Wildlife Federation in January. The January count included 668 adults, 208 immatures, and 46 unclassified.

"We believe the EVE figures present a more accurate picture of the wintering population along the Mississippi River," stated Terry Ingram, EVE's executive director. "A count made over nearly three weeks will have inaccuracies because of the tremendous mobility of these birds. Many might be counted more than once, and some are bound to be missed. Also, there was a heavy southward migration in January, whereas in early February the population was more settled. A two-day count also provides stronger data on concentrations in feeding areas."

Regarding the mobility of bald eagles, Ingram noted the difference between counts taken two days apart at Cassville, Wisconsin. "On January 3, an aerial survey made by the U.S. Fish and Wildlife Service showed 19 adults and three immatures in the Cassville area. On January 5, I counted 56 adults and four immatures in the same area while leading a bus tour."

Two concentrations of bald eagles shown in both counts merit special attention. There were large numbers of eagles in the vicinity of Cordova, Illinois—194 in EVE's February count, and 119 in the NWF January count. Both surveys revealed that most of the birds (160 in February) were *upstream* from the nuclear power plant near Cordova and thus not feeding in the open water downstream from the plant.

"We don't know why so many birds are concentrating above Cordova," said Ingram. "Obviously there's a major food source. But we've seen only small patches of open water upstream from the power plant. It might be that these large numbers are the result of an increased number of

observers in the area. There may be an increase in the fish population attracting the eagles. Or there may be fish kills taking place—that stretch of river is heavily industrialized. If fish kills are occurring because of pollution, we need to find the source of the problem, because the eagles may be picking up toxic substances in their food."

The second major concentration of wintering bald eagles was along the Illinois River, where 460 eagles were counted in January. The February count along the Illinois River had to be cancelled at the last minute.

Ingram noted that the same reasons for the concentrations at Cordova—more observers, a larger food supply, or fish kills—may explain the large number of eagles along the Illinois River. "It may also be part of the Mississippi River population temporarily shifted over to the Illinois River."

Though the wintering population appears to be stable, Ingram cautioned that large numbers don't necessarily mean dangers to the eagles' survival have ceased to exist. "We need to know more about historic wintering sites so we can continue to identify and set aside land these birds need to help them survive the stresses of winter," he said. "And we need to know more about what and where they are eating, in order to find out whether or not they're picking up poisons that might affect reproductivity."

The Living Tree: Nature's Own Air Conditioner

It may be more energy-wise to plant trees than to add a few inches of insulation, says a director of the American Society of Home Inspectors. Research in New England determined shade trees on the south-southwestern side of a home could save as much as $50 a year in cooling costs. A large-leaved deciduous tree's shade equals a halt ton of air-conditioning capacity.

Every day, 2,000 acres of land in the United States are taken from rural uses and converted into urban areas. With populations increasing, a good question to ask is: how much landscape and trees do we need per person? Recommendations by the University of Utah's Environmental Impact Office are 200 square feet of live plant area per person, including one tree for every two people, plus one tree for every car in use. Every fifth tree should be an evergreen.

Algae for Food and Fuel

Algae, among the humblest and most abundant of earth's organisms, may hold a solution to two of the world's most pressing scarcity problems: food and fuel. According to *Environment* magazine, Israeli scientists who have been cultivating the plant in salty desert ponds say it could be the "soybean of the future," thanks to its high protein content and ability to thrive in environments that are hostile to other forms of life. And an Australian report predicts that algae refined to produce methane gas or ketones could shortly supply 60 percent of that nation's motor fuel needs.

Cobra Venom May Yield Effective Snake Antivenin

Researchers at the University of Idaho say their studies of cobra venom may lead to vaccines capable of protecting humans and animals against all forms of snakebite.

Zoologists Ken Laurence and Darwin Vest say they have succeeded in protecting animals against the lethal effects of cobra venom with a single vaccination prior to injecting the venom.

A by-product of their research they say, is a faster method of producing antivenin to counteract effects of snakebites on victims. The new antivenin appears to be more effective and less dangerous than the variety now on the market, they report.

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We wish to recognize those generous donors who have helped so far in 1980 to meet the current budget. By way of recognition, we place on the Honor Roll of Donors the following who have contributed $1,000 or more during the period January 1 through June 30, 1980, and extend to each our heartfelt thanks.

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September & October at Field Museum

(September 15 through October 15

New Exhibit

"The Great Bronze Age of China: An Exhibition from the People's Republic of China." The most important archeological exhibit ever to come out of China makes its only Midwest showing at Field Museum. The exhibit features recent discoveries that have fundamentally changed our knowledge of ancient Chinese history and art. The 105 treasures, dating from about 1800 B.C., include bronze vessels, jade sculptures, and eight life-size clay figures from the spectacular "buried army" of China's first emperor. Exhibit curator: Bennet Bronson; designer: Clifford Abrams. Through October 29. Halls 26 and 27, 2nd floor.

Continuing Exhibits

"Fossil Vertebrates." There's something new in the Museum's famous "Dinosaur Hall"—the 72-foot-long apatosaurus dinosaur has a new head! When it was recently discovered that all apatosaurus (formerly called brontosaurus) specimens were mounted with incorrect heads, Museum staff replaced the old head with a cast of the correct skull. You can also see skeletons of other prehistoric animals, the renowned Charles R. Knight murals, and a life-size diorama of a Coal Period forest. Hall 38, 2nd floor.

"Hall of Useful Plants." Is it a poison or a medicine? In large doses, curare, a plant product, can be fatal to man; but in low doses, it induces muscle relaxation, a condition especially desirable in certain surgical procedures. Other medicinal plant products displayed here are antibiotics, digitalis, and quinine. You can also find out about the origins of hallucinogens, mind-altering drugs, and pacifiers in this hall. Hall 28, 2nd floor.

"Portraits of Man." This excellent collection of lifelike bronze statues depicting mankind around the world is the work of Malvina Hoffman (1885-1966), who did some of her earlier work under Auguste Rodin. 2nd floor balcony and ground floor.

New Programs

Free Films on Ancient China are offered for the duration of "The Great Bronze Age of China" exhibit. *China: The Beginnings* discusses the search for the origin of Chinese civilization. *China: Hundred Schools to One* documents the warring between the states and the formation of the Qin empire. *Xian* traces the history of the ancient imperial city of that name. Films are screened each Friday, Saturday, and Sunday in Lecture Hall I at 11 a.m., 12:30 p.m., and 2 p.m., respectively. Made possible by a grant from the National Endowment for the Humanities.

The Great Bronze Age of China Lecture Series. Don't miss the last two programs in this series of outstanding lectures by noted speakers. Fridays, 8 p.m., Simpson Theatre. Tickets (Members $2, nonmembers $3.50) are available from the Education Department (322-8854), or at the lecture door. Sept. 26: *From Warring States to Empire: China During the Zhou and Qin Dynasties* with Dr. Derk Bodde, University of Pennsylvania. Oct. 3: *Recent Discoveries in Chinese Bronze Age Art: New Answers and Questions* with Dr. Virginia C. Kane, University of Michigan.

Third Annual Festival of Anthropology on Film. Come experience the cultures of the world in one weekend! Fifty fascinating films will examine ritual and possession, men and women, music and dance, and other subjects. A world leader in visual

(Continued on back cover)

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September & October at Field Museum

(Continued from inside back cover)

anthropology. Jean Rouch of the Musée de l'Homme in Paris, will give the keynote lecture and lead a workshop on filmmaking techniques. Order your tickets in advance from the Education Department (322-8854), or purchase them at the West Door on the days of the festival. Saturday and Sunday, September 27 and 28, 10 a.m.-5 p.m. (both days). Tickets: one day: Members $7, nonmembers $8; both days: Members $12, nonmembers $15. For film schedules see pp. 13-16.

Edward E. Ayer Film Lecture Series. Explore distant corners of the world every Saturday during October and November at 2:30 p.m. in the Simpson Theatre. Narrated by the filmmakers themselves, these 90-minute film/lectures are recommended for adults. Admission is free at the West Door; Members receive priority seating. Oct. 4: *England* with Howard and Lucia Meyers. October 11: *The Great Smoky Mountains* with Richard Kern.

Fall Journey: "Fossils in the Floor." Did you know that you can find fossils in Museum floors? Discover where they are and what they are in this self-guided tour. You'll also visit the fossil collections. Free *Journey* pamphlets are available at Museum entrances.

Courses for Adults begin October 14. Enroll now for *Animals in Human Perspective*. This special Learning Museum course probes our favorite ideas about the animal kingdom from Jaws to Lassie. Other courses explore current topics in anthropology, botany, geology, and zoology. All courses are noncredit, and require advance registration by mail. Call 322-8855. For further details see pp. 22-25.

Weekend Discovery Programs. Each Saturday and Sunday between 11 a.m. and 3 p.m., you can participate in a variety of free tours, demonstrations, and films on natural history topics. Check the *Weekend Sheet* available at Museum entrances for locations and additional programs.

- "Stories of the Field Museum" gives the fascinating stories behind some of the best-known exhibits, including Bushman, Su-Lin the panda, and the Tsavo man-eating lions. Saturday, Sept. 20, noon.
- "Subsistence Societies" Film Feature: *Qeros: The Shape of Survival* examines the Peruvian Indians located high in the Andes. Saturday, Sept. 20, 1 p.m.
- "Culture and History of Ancient Egypt" concentrates on the Museum's collection of Egyptian artifacts, and concludes with a description of the mummification process; 45-minute tour. Sunday, Sept. 21, 2:30 p.m.
- "Ancient Ocean Environments" focuses on the underwater world of ancient invertebrate animals. Half-hour tour. Saturday, Sept. 27, 1:30 p.m.
- "Culture and History of Ancient Egypt." Sunday, Sept. 28, 2:30 p.m.
- "China Through the Ages" looks at the inventions, court life, and schools of thought in traditional China. 30-minute tour. Saturday, Oct. 4, 1:30 p.m.
- "Rocks of All Ages" Film Feature: *This Land* traces the development of the North American continent from a lifeless expansion of rock to the coming of man. Sunday, Oct. 5, 1 p.m.
- "Stories of the Field Museum." Saturday, Oct. 11, noon.
- "Clay Dinosaurs." Sunday, Oct. 12, 11 a.m.-1 p.m.
- "Rocks of All Ages" Film Feature: *Evidence from Ancient Life* examines the relation between plant and animal evolution and the history of the earth's more prominent changes. Sunday, Oct. 12, 1 p.m.

3rd Annual Festival of Anthropology on Film

50 FILMS

September 27, 28

JEAN ROUCH KEYNOTE SPEAKER

see pages 13-16

Continuing Programs

Volunteer Opportunities. Individuals with an interest in working with school groups, presenting tours, and participating in other educational programs are asked to contact the Volunteer Coordinator at 922-9410, ext. 360.

September and October Hours. The Museum opens daily at 9 a.m. and closes at 5 p.m. every day except Friday. On Fridays the Museum remains open until 9 p.m. throughout the year.

The Museum Library is open weekdays from 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor.

Museum telephone: (312) 922-9410.

October
1980

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

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Field Museum of Natural History

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President: E. Leland Webber
Director: Lorin I. Nevling, Jr.

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COVER

Wisconsin lake shoreline in autumn. Photo by Robert Brudd, of Tinley Park, Illinois.

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I certify that the statements made by me above are correct and complete. *Lorin I. Nevling, Jr., director.*

FIELD BRIEFS

Fredrick A. Schmigle (right), regional public relations manager for Foster and Kleiser, a Metromedia Company, presents Field Museum's Public Relations Manager Mary Cassai and Field Museum Vice President of Development Thomas R. Sanders with a complimentary billboard from his company. Nearly 50 feet long and 20 feet high, this "Great Bronze Age of China" display has been installed just off Chicago's Outer Drive on Broadway, west side of the street, south of Hollywood Boulevard. It will remain on display throughout the exhibit, which closes October 29. Custom-made and hand-painted, this billboard was donated through the courtesy of Bert K. Dart, vice president, regional manager, Foster and Kleiser.

The camera of Field Museum photographer Ron Testa captures the silent splendor of life-size terracotta figures on view in "The Great Bronze Age of China" exhibit.

"The Philippine (Monkey-eating) Eagle Expedition"

Ray A. Kroc Environmental Film Lecture

Friday, November 14, 8:00 p.m.

JAMES SIMPSON THEATRE

Field Museum's Fall Ray A. Kroc Environmental Film Lecture focuses on the rare and endangered Philippine (Monkey-eating) Eagle. "The Philippine (Monkey-eating) Eagle Expedition" film makes its Chicago premiere at Field Museum. Narrated by filmmaker Alan Degen of F.R.E.E., Ltd. (Films and Research for an Endangered Environment, Ltd.), this intense documentary film depicts the drama of adult eagles raising their young amidst one of the most threatened environments on earth. These magnificent predators are fighting for survival in the tropical rain forests of the Philippines. The film captures the intimacies eagles share, and the hazards these birds face in the wild. The ravages of forest destruction and human encroachment are pushing this second largest of the eagle family to the brink of extinction.

Endemic to the Philippines, this eagle once ranged over most of the larger Philippine islands, Luzon, Mindanao, Leyte, and Samar. Today, its population is reduced to less than 500 individual birds. It lays only one egg every two years, and the offspring depends on its parents for more than a year after learning to fly.

Alan Degen, a filmmaker and naturalist with F.R.E.E., Ltd., studied wildlife biology at Arizona State University and the University of Montana. He has participated in three expeditions to South America to study the breeding of the Harpy Eagle and is currently involved in studying the Philippine (Monkey-eating) Eagle.

This film lecture is guaranteed to fascinate audiences of all ages. For more information, see the November Calendar of Events, or call 322-8854.

Immature Philippine (monkey-eating) eagle

Courtesy F.R.E.E., Ltd.

Endangered Species and Threatened Species Lists Updated

The official U.S. list of endangered and threatened wildlife and plants worldwide now carries 773 species, 276 of which are native to the United States.

"That's up 77 from last year," Paul Opler of the U.S. Fish and Wildlife Service's Endangered Species Office said, referring to the previous list published in January of 1979. "But that increase," he was quick to add, "has more to do with improved research than the continuing, general deterioration of the world's wildlife environment. We're simply finding more plants and animals that need to be classified."

An "endangered" species is one that is in danger of extinction throughout all or a significant part of its range. A "threatened" species is one that is likely to become "endangered."

The additions made to the list of endangered and threatened species in the last year and a half come from every part of the earth. Two of them—Guatemalan fir and the Chilean false larch—are the first foreign plants ever to be listed. Other species include the Caribbean monk seal, West African manatee, North China Sika deer, and the Kern (California) primrose sphinx moth. During the last 16 months, 36 plants (mostly cacti), 29 mammals, 9 reptiles, 4 fish, 1 bird, and 2 insects were added to the revised list.

The basic cause for endangerment of either animals or plants is loss of habitat. Many of these species are important for economic, commercial, and historic reasons. Some, such as a number of cacti native to the southwestern U.S., recently have become extremely popular house and garden plants. Others have suffered exploitation and destruction of their habitats for a much longer time.

Since at least the time of the ancient Mayan Empire, Indians have burned the highland forest habitat of the Guatemalan fir to plant corn. The practice is still followed, and reproduction of the rare trees is further limited by the grazing of sheep and goats.

The decline of the Chilean false larch, a tree that may live for 3,000 years and grow to be 150 feet tall, began almost 400 years ago when the Spanish Conquistadores learned of the amazing durability of its wood. Widely exported since that time, it has been nearly eliminated from all accessible sites.

Seamen of those times replenished their ships' stores with fresh meat from the Caribbean monk seals that inhabited the waters of the West Indies. Later, the seals were taken for the oil and pelt trade. But it was modern-day commercial fishermen, who saw the seals as fish predators, that may have delivered the final blow to the animal. No monk seals have been officially recorded since the early 1960s. The totoaba, a huge sea trout that grows to 225 pounds and lives only in the Gulf of California, is another valuable animal that has suffered from commercial exploitation. In 1905, according to an old biological survey report, "totoaba thronged the east shore of Lower California and choked the mouth of the Colorado River." Since then, however, it has been fished almost to the point of extinction.

Once a plant or animal is listed as threatened or endangered under the Endangered Species Act, a variety of activities involving the species are strictly regulated. For United States species, laws provide for protection of its habitat and limit the conditions under which it may or may not be taken, or used in interstate commerce, or exported to other countries. The laws also cover all listed foreign species, controlling how any of them may or may not be imported into the United States. In addition, the U.S. government offers technical assistance to state and foreign governments for the conservation of endangered species. Since the Endangered Species Act of 1973 was enacted, the U.S. list has almost tripled from 106 to 276.

U.S. World List of Endangered and Threatened Animals and Plants as of May 1, 1980

Category	Number of Endangered Species			Number of Threatened Species		
	U.S.	Foreign	Total	U.S.	Foreign	Total
Mammals	35	251	286	3	21	24
Birds	67	145	212	3	0	3
Reptiles	12	55	67	10	0	10
Amphibians	5	9	14	2	0	2
Fishes	31	11	42	12	0	12
Snails	2	1	3	5	0	5
Clams	23	2	25	0	0	0
Crustaceans	1	0	1	0	0	0
Insects	6	0	6	3	0	3
Plants	49	0	49	7	2	9
Total	231	474	705	45	23	68

Endangered Species

Vertebrates of Mexico, Canada, the United States and its possessions, and the Caribbean

Common name	Scientific name	Historic range	Vertebrate population where endangered
MAMMALS			
Bat, gray	*Myotis grisescens*	Central and S.E. U.S.A.	Entire
Bat, Hawaiian hoary	*Lasiurus cinereus*	U.S.A. (Hawaii)	Entire
Bat, Indiana	*Myotis sodalis*	E. and Midwest U.S.A.	Entire
Bat, Ozark big-eared	*Plecotus townsendii ingens*	U.S.A. (MO, OK, AR)	Entire
Bat, Virginia big-eared	*Plecotus townsendii virginianus*	U.S.A. (KY, WV, VA, IN, IL, OH)	Entire
Bear, Mexican grizzly	*Ursus arctos nelsoni*	Mexico	Entire
Bison, wood	*Bison b. athabascae*	Canada, NW U.S.A.	Canada
Bobcat	*Felis rufus escuinape*	central Mexico	Entire
Cougar, eastern	*Felis concolor cougar*	East. No. Amer.	Entire
Deer, Cedros Island mule	*Odocoileus hemionus cedrosensis*	Mexico (Cedros Island)	Entire
Deer, Columbian white-tailed	*Odocoileus virginianus leucurus*	U.S.A. (WA, OR)	Entire
Deer, key	*Odocoileus virginianus clavium*	U.S.A (So. FL)	Entire
Dugong	*Dugong dugong*	E. Africa to so. Japan, incl. U.S.A. (Trust Territories)	Entire
Ferret, black-footed	*Mustela nigripes*	West. U.S.A., West. Canada	Entire
Fox, Northern swift	*Vulpes velox hebes*	U.S.A. (No. plains), Canada	Canada
Fox, San Joaquin kit	*V. macrotis mutica*	U.S.A. (California)	Entire
Jaguar	*Panthera onca*	U.S.A. (TX, NM, AZ), Cent. and So. America	Mexico southward
Jaguarundi	*Felis yagouaroundi cacomitli*	U.S.A. (TX), Mexico	Entire
Jaguarundi	*F. yagouaroundi fossata*	Mexico, Nicaragua	Entire
Jaguarundi	*F. yagouaroundi tolteca*	U.S.A. (AZ), Mexico	Entire
Manatee, West Indian (Florida)	*Trichechus manatus*	U.S.A. (S.E.), Caribbean Sea, South America	Entire
Margay	*Felis wiedii*	U.S.A. (NM, AZ), Central and South America	Mexico southward
Monkey, howler	*Alouatta villosa*	Mexico to So. America	Entire
Mouse, salt marsh harvest	*Reithrodontomys raviventris*	U.S.A. (CA)	Entire
Ocelot	*Felis pardalis*	SW U.S.A., Central and So. America	Mexico southward
Panther, Florida	*Felis concolor coryi*	U.S.A. (LA and AR east to SC and FL)	Entire
Prairie dog, Mexican	*Cynomys mexicanus*	Mexico	Entire
Prairie dog, Utah	*C. parvidens*	U.S.A. (Utah)	Entire
Pronghorn, peninsular	*Antilocapra americana peninsularis*	Mexico (Baja California)	Entire
Pronghorn, Sonoran	*A. americana sonoriensis*	U.S.A. (AZ), Mexico	Entire
Rabbit, volcano	*Romerolagus diazi*	Mexico	Entire
Rat, Morro Bay kangaroo	*Dipodomys heermanni*	U.S.A. (CA)	Entire
Seal, Caribbean monk	*Monachus tropicalus*	Caribbean Sea, Gulf of Mexico	Entire
Seal, Hawaiian monk	*M. schauinslandi*	Hawaiian archipelago	Entire
Solenodon, Cuban	*Atopogale cubana*	Cuba	Entire
Solenodon, Haitian	*Solenodon paradoxus*	Dominican Republic, Haiti	Entire
Squirrel, Delmarva Peninsula fox	*Sciurus niger cinereus*	U.S.A. (DelMarVa Peninsula to S.E. PA)	Entire
Tapir, Central American	*Tapirus bairdii*	So. Mexico to Colombia and Ecuador	Entire
Whale, blue	*Balaenoptera musculus*	Oceanic	Entire
Whale, bowhead	*Balaena mysticetus*	Oceanic (No. latitudes only)	Entire
Whale, finback	*Balaenoptera physalus*	Oceanic	Entire
Whale, gray	*Eschrichtius robustus*	No. Pacific; coastal and Bering Sea	Entire
Whale, humpback	*Megaptera novaeangliae*	Oceanic	Entire
Whale, right	*Balaena glacialis*	Oceanic	Entire
Whale, Sei	*Balaenoptera borealis*	Oceanic	Entire
Whale, sperm	*Physeter catodon*	Oceanic	Entire
Wolf, gray	*Canis lupus*	Holarctic	U.S.A. (lower 48 states except MN), Mexico
Wolf, red	*C. rufus*	U.S.A. (S.E. west to cent. TX)	Entire
BIRDS			
Akepa, Hawaii (honeycreeper)	*Loxops coccinea coccinea*	U.S.A. (Hawaii)	Entire
Akepa, Maui (honeycreeper)	*L. coccinea ochracea*	Hawaii	Entire
Akialoa, Kuai (honeycreeper)	*Hemignathus procerus*	Hawaii	Entire
Akipolaau (honeycreeper)	*H. wilsoni*	Hawaii	Entire
Albatross, short-tailed	*Diomedea albatrus*	No. Pacific, Japan, U.S.S.R., U.S.A. (AK, CA, HA, OR, WA)	Entire except U.S.A.
Blackbird, yellow-shouldered	*Agelaius xanthomus*	Puerto Rico	Entire
Bobwhite, masked (quail)	*Colinus virginianus ridgwayi*	U.S.A. (AZ), Mexico (Sonora)	Entire
Cahow (Bermuda petrel)	*Pterodroma cahow*	N. Atlantic, Bermuda	Entire
Condor, California	*Gymnogyps californianus*	U.S.A. (OR, CA), Mexico (Baja California)	Entire
Coot, Hawaiian	*Fulica americana alai*	Hawaii	Entire

Common name	Scientific name	Historic range	Vertebrate population where endangered
Crane, Cuba sandhill	*Grus canadensis nesiotes*	West Indies, Cuba	Entire
Crane, Mississippi sandhill	*Grus canadensis pulla*	Mississippi	Entire
Crane, whooping	*Grus americana*	Canada, U.S.A. (Rockies to Carolinas), Mexico	Entire
Creeper, Hawaiian	*Loxops maculata mana*	Hawaii	Entire
Creeper, Molokai (Kakawahie)	*Loxops maculata llammea*	Hawaii	Entire
Creeper, Oahu (Alauwahio)	*Loxops maculata maculata*	Hawaii	Entire
Crow, Hawaiian (Alala)	*Corvus tropicus*	Hawaii	Entire
Curassow, Trinidad, white-headed	*Pipile pipile pipile*	West Indies, Trinidad	Entire
Curlew, Eskimo	*Numenius borealis*	Alaska, No. Canada to Argentina	Entire
Dove, Grenada	*Leptotila wellsi*	West Indies, Grenada	Entire
Dove, Palau ground	*Gallicolumba canifrons*	West Pacific, Palau Islands	Entire
Duck, Hawaiian (Koloa)	*Anas wyvilliana*	Hawaii	Entire
Duck, Laysan	*Anas laysanensis*	Hawaii	Entire
Eagle, Harpy	*Harpia harpyja*	Mexico south to Argentina	Entire
Eagle, bald	*Haliaeetus leucocephalus*	N. America south to No. Mexico	Lower 48 states except WA, OR, MI, WI, MI
Falcon, American peregrine	*Falco peregrinus anatum*	Canada, U.S.A., Mexico	Entire
Falcon, Arctic peregrine	*Falco peregrinus tundrius*	Alaska to Greenland, so. to Argentina	Entire
Finch, Laysan (Honeycreeper)	*Telespyza (-Psittirostra) cantans*	Hawaii	Entire
Finch, Nihoa (honeycreeper)	*Telespyza (-Psittirostra) ultima*	Hawaii	Entire
Flycatcher, Euler's	*Empidonax euleri johnstonei*	West Indies, Grenada	Entire
Flycatcher, Palau fantail	*Rhipidura lepida*	West Pacific, Palau Islands	Entire
Flycatcher, Tinian monarch	*Monarcha takatsukasae*	West Pacific, Marianas Islands	Entire
Gallinule, Hawaiian	*Gallinula chloropus sandvicensis*	Hawaii	Entire
Goose, Aleutian Canada	*Branta canadensis leucopareia*	U.S.A. (AK, CA, OR, WA), Japan	Entire
Goose, Hawaiian (Nene)	*Branta sandvicensis*	Hawaii	Entire
Grackle, slender-billed	*Cassidix palustris*	Mexico	Entire
Guan, horned	*Oreophasis derbianus*	Guatemala, Mexico	Entire
Hawk, Hawaiian (Lo)	*Buteo solitarius*	Hawaii	Entire
Honeycreeper, crested (Akohekohe)	*Palmeria dolei*	Hawaii	Entire
Kite, Cuba hook-billed	*Chondrohierax uncinatus wilsonii*	West Indies: Cuba	Entire
Kite, Grenada hook-billed	*Chondrohierax uncinatus mirus*	West Indies: Grenada	Entire
Kite, Everglade (snail kite)	*Rostrhamus sociabilis plumbeus*	Florida	Entire
Mallard, Marianas	*Anas oustaleti*	Guam, Marianas Island	Entire
Megapode, La Perouse's	*Megapodius laperouse*	Palau Island, Marianas Island	Entire
Millerbird, Nihoa (willow warbler)	*Acrocephalus familiaris kingi*	Hawaii	Entire
Nukupuu (honeycreeper)	*Hemignathus lucidus*	Hawaii	Entire
Oo, Kauai (Oo Aa) (honeyeater)	*Moho braccatus*	Hawaii	Entire
Ou (honeycreeper)	*Psittirostra psittacea*	Hawaii	Entire
Owl, Palau	*Otus podargina*	Palau Islands	Entire
Palila (Honeycreeper)	*Psittirostra bailleui*	Hawaii	Entire
Parrot, Bahaman or Cuban	*Amazona leucocephala*	Cuba, Bahamas, Caymans	Entire
Parrot, imperial	*Amazona imperialis*	Dominica	Entire
Parrot, Puerto Rican	*Amazona vittata*	Puerto Rico	Entire
Parrot, red-necked	*Amazona arausiaca*	Dominica	Entire
Parrot, St. Lucia	*Amazona versicolor*	St. Lucia	Entire
Parrot, St. Vincent	*Amazona guildingii*	St. Vincent	Entire
Parrot, thick-billed	*Rhynchopsitta pachyryncha*	Mexico, AZ, NM	Mexico
Parrotbill, Maui (honeycreeper)	*Pseudonestor xanthophrys*	Hawaii	Entire
Pelican, brown	*Pelecanus accidentalis*	Carolinas to TX, CA; West Indies, Cent. America, coastal So. America	Entire
Petrel, Hawaiian dark-rumped	*Pterodroma phaeopygia sandwichensis*	Hawaii	Entire
Pigeon, Puerto Rican plain	*Colomba inornata wetmorei*	Puerto Rico	Entire
Poo-uli	*Melamprosops phaeosoma*	Hawaii	Entire
Prairie chicken, Attwater's greater	*Tympanuchus cupido attwateri*	Texas	Entire
Quail, Merriam's Montezuma	*Cyrtonyx montezumae merriami*	Mexico (Vera Cruz)	Entire
Quetzel, resplendent	*Pharomachrus mocinno*	Mexico to Panama	Entire
Rail, California clapper	*Rallus longirostrisi obseletus*	California	Entire
Rail, light-footed clapper	*Rallus longirostrisi levipes*	California, Baja California	Entire
Rail, Yuma clapper	*Rallus longirostrisi yumanensis*	Mexico, U.S.A. (AZ, CA)	Entire
Shrike, San Clemente loggerhead	*Lanius ludovicianus mearnsi*	California	Entire
Sparrow, Cape Sable seaside	*Ammospiza maritima mirabilis*	Florida	Entire
Sparrow, dusky seaside	*Ammospiza maritima nigrescens*	Florida	Entire
Sparrow, Santa Barara song	*Melospiza melodia graminea*	California	Entire
Starling, Ponape mountain	*Aplonis pelzelni*	Caroline Island	Entire
Stilt, Hawaiian	*Himantopus himantopus knudseni*	Hawaii	Entire
Tern, California least	*Sterna albifrons browni*	Mexico, California	Entire
Thrasher, white-breasted	*Rhamphocincius brachyurus*	St. Lucia, Martinique	Entire
Thrush, large Kauai	*Phaeornis obscurus myadestina*	Hawaii	Entire
Thrush, Molokai (Olomau)	*Phaeornis obscurus rutha*	Hawaii	Entire
Thrush, small Kauai (Pauiohi)	*Phaeornis palmeri*	Hawaii	Entire
Trembler, Martinique brown (Thrasher)	*Cinclocerthia ruficauda gutturalis*	Martinique	Entire

Common name	Scientific name	Historic range	Vertebrate population where endangered
Warbler (wood), Bachman's	*Vermivora bachmanii*	Cuba, S.E. U.S.A.	Entire
Warbler (wood), Barbados yellow	*Dendroica petechia petechia*	Barbados	Entire
Warbler (wood), Kirtland's	*Denroica kirtlandii*	U.S.A. (principally MI), Canada, Bahamas	Entire
Warbler (wood), Semper's	*Leucopeza semperi*	St. Lucia	Entire
Whip-poor-will, Puerto Rican	*Caprimulgus noctitherus*	Puerto Rico	Entire
White-eye, Ponape great	*Rukia, longirostra (-sanfordi)*	Caroline Islands	Entire
Woodpecker, imperial	*Campephilus imperialis*	Mexico	Entire
Woodpecker, ivory-billed	*Campephilus principalis*	U.S.A. (southcentral and southeastern), Cuba	Entire
Woodpecker, red-cockaded	*Picoides (-Dendrocopus) borealis*	U.S.A. (southcentral and southeastern)	Entire
Wren, Guadeloupe house	*Troglodytes aedon guadelupensis*	Guadeloupe	Entire
Wren, St. Lucia house	*Troglodytes aedon mesoleucus*	St. Lucia	Entire
REPTILES			
Alligator, American	*Alligator mississippiensis*	Southeastern U.S.A.	Wherever found in wild except where listed as threatened
Alligator, American	*Alligator mississippiensis*	Southeastern U.S.A.	In captivity wherever found
Anole, Culebra giant	*Anolis roosevelti*	Puerto Rico (Culebra Island)	Entire
Boa, Jamaican	*Epicrates subflavus*	Jamaica	Entire
Boa, Puerto Rico	*Epicrates inornatus*	Puerto Rico	Entire
Boa, Virgin Islands tree	*Epicrates monensis granti*	U.S. and British Virgin Islands	Entire
Chuckwalla, San Esteban Island	*Sauromalus varius*	Mexico	Entire
Crocodile, American	*Crocodylus acutus*	Florida, Mexico, So. America, Cent. America, Caribbean	Entire
Crocodile, Cuban	*Crocodylus rhombifer*	Cuba	Entire
Crocodile, Morelet's	*Crocodylus moreleti*	Mexico, Belize, Guatemala	Entire
Iguana, Anegada ground	*Cyclura pinguis*	Anegada Island (British Virgin Islands)	Entire
Lizard, blunt-nosed leopard	*Crotaphytus silus*	California	Entire
Lizard, St. Croix ground	*Ameiva polops*	Green Cay, Protestant Cay (U.S. Virgin Islands)	Entire
Snake, San Francisco garter	*Thamnophis sirtalis tetrataenia*	California	Entire
Tortoise, Bolson	*Gopherus flavomarginatus*	Mexico	Entire
Turtle, aquatic box	*Terrapene coahuila*	Mexico	Entire
Turtle, Cuatro cienegas softshell	*Trionyx ater*	Mexico	Entire
Turtle, green sea	*Chelonia mydas*	circumglobal in tropical and temperate seas and oceans	Breeding colony populations in Florida and on Pacific coast of Mexico
Turtle, hawksbill sea (-carey)	*Eretmochelys imbricata*	Tropical seas	Entire
Turtle, Kemp's (-Atlantic) Ridley sea	*Lepidochelys kempii*	Tropical and moderate seas	Entire
Turtle, leatherback sea	*Dermochelys coriacea*	Tropical, temperate, and subpolar seas	Entire
Turtle, Olive (Pacific) Ridley sea	*Lepidochelys olivacea*	Circumglobal in tropical and temperate seas and oceans	Breeding colony populations on Pacific coast Mexico
Turtle, Plymouth red-bellied	*Chrysomys (-Pseudemys) rubriventris bangsi*	Massachusetts	Entire
AMPHIBIANS			
Salamander, desert slender	*Batrachoseps aridus*	California	Entire
Salamander, Santa Cruz long-toed	*Ambystoma macrodactylum croceum*	California	Entire
Salamander, Texas blind	*Typhylomolge rathbuni*	Texas	Entire
Toad, Houston	*Bufo houstonensis*	Texas	Entire
Treefrog, pine barrens	*Hyla andersonii*	FL, AL, NC, SC, NJ	Entire
FISHES			
Blindcat, Mexican	*Prietella phreatophila*	Mexico	Entire
Bonytail, Pahranagat	*Gila robusta jordani*	Nevada	Entire
Chub, bonytail	*Gila elegans*	AZ, CA, CO, NV, UT, WY	Entire
Chub, humpback	*Gila cypha*	CA	Entire
Cisco, longjaw	*Coregonus alpenae*	Lakes Michigan, Huron, Erie	Entire
Cui-ui	*Chasmistes cujus*	Nevada	Entire
Dace, Kendall Warm Springs	*Rhinichthys osculus thermalis*	Wyoming	Entire
Dace, Moapa	*Moapa coriaces*	Nevada	Entire
Darter, fountain	*Ethiostoma fonticola*	Texas	Entire
Darter, Maryland	*Ethiostoma sellare*	Maryland	Entire
Darter, Okaloosa	*Etheostoma okaloosae*	Florida	Entire
Darter, snail	*Percina tanasi*	Tennessee	Entire
Darter, watercress	*Etheostoma nuchale*	Alabama	Entire
Gambusia, Big Bend	*Gambusia gaigei*	Texas	Entire
Gambusia, Clear Creek	*Gambusia heterochir*	Texas	Entire

Common name	Scientific name	Historic range	Vertebrate population where endangered
Gambusia, Goodenough	*Gambusia amistadensis*	Texas	Entire
Gambusia, Pecos	*Gambusia nobilis*	New Mexico, Texas	Entire
Killifish, Pahrump	*Empetrichthys latos*	Nevada	Entire
Madtom, Scioto	*Noturus trautmani*	Ohio	Entire
Pike, blue	*Stizostedion vitreum glaucum*	Lakes Erie and Ontario	Entire
Pupfish, Comanche Springs	*Cyprinodon elegans*	Texas	Entire
Pupfish, Devil's Hole	*Cyprinodon diabolis*	Nevada	Entire
Pupfish, Owens River	*Cyprinodon radiosus*	Calif.	Entire
Pupfish, Tecopa	*Cyprinodon nevadensis calidae*	Calif.	Entire
Pupfish, Warm Springs	*Cyprinodon nevadensis pectoralis*	Nevada	Entire
Squawfish, Colorado River	*Ptychocheilus lucius*	AZ, CA, CO, MN, NV, UT, WY	Entire
Stickleback, unarmed threespine	*Gasterosterus aculeatus williamsoni*	Calif.	Entire
Sturgeon, shortnose	*Acipenser brevirostrum*	U.S.A. and Canada (Atlantic coast)	Entire
Topminnow, Gila	*Poeciliopsis occidentalis*	AZ, NM, Mexico	Entire
Totoaba (seatrout or weakfish)	*Cynoscion macodonaldi*	Mexico (Gulf of California)	Entire
Trout, Gila	*Salmo gilae*	New Mexico	Entire
Woundfin	*Plagopterus argentissimus*	AZ, NV, UT	Entire

Threatened Species

Vertebrates of Mexico, Canada, the United States and its possessions, and the Caribbean

Common name	Scientific name	Historic range	Vertebrate population where threatened
MAMMALS			
Bear, brown or grizzly	*Ursus arctos horribilis*	Canada, western U.S.A.	Lower 48 states
Monkey, black howler	*Alouatta pigra*	Mexico, Belize, Guatamala	Entire
Otter, southern sea	*Enhydra lutris nereis*	West Coast U.S.A (WA) south to Mexico (Baja Calif.)	Entire
Wolf, gray	*Canis lupus*	Holarctic	U.S.A. (MN)
BIRDS			
Eagle, bald	*Haliaeetus leucocephalus*	No. America south to northern Mexico	U.S.A. (WA, OR, MN, WI, MI)
Shearwater, Newell's Manx	*Puffinus puffinus newelli*	Hawaii	Entire
Sparrow, San Clemente sage	*Amphispiza belli clementeae*	Calif.	Entire
REPTILES			
Alligator, American	*Alligator mississippiensis*	S.E. U.S.A.	U.S.A. (FL, SC, TX, and certain areas of GA, LA)
Boa, Mona	*Epicrates monensis monensis*	Puerto Rico	Entire
Iguana, Mona ground	*Cyclura stejnegeri*	Mona Island (Puerto Rico)	Entire
Lizard, island night	*Klauberina riversiana*	Calif.	Entire
Rattlesnake, New Mexico ridge-nosed	*Crotalus willardi obscurus*	New Mexico, Mexico	Entire
Snake, Atlantic salt marsh	*Nerodia fasciata taeniata*	Florida	Entire
Snake, eastern indigo	*Drymarchon corais couperi*	AL, FL, GA, MS, SC	Entire
Turtle, green sea	*Chelonia mydas*	Circumglobal in tropical and temperate seas and oceans	Wherever found except where listed as endangered
Turtle, loggerhead sea	*Caretta caretta*	Circumglobal in tropical and temperate seas and oceans	Entire
Turtle, Olive (Pacific) Ridley sea	*Lepidochelys olivacea*	Circumglobal in tropical and temperate seas and oceans	Wherever found except where listed as endangered
AMPHIBIANS			
Coqui, golden	*Eleutherodactylus jasperi*	Puerto Rico	Entire
Salamander, Red Hills	*Phaeognathus hubrichti*	Alabama	Entire
FISHES			
Cavefish, Alabama	*Speoplatyrhinus poulsoni*	Alabama	Entire
Chub, slender	*Hybopsis cahni*	TN, VA	Entire
Chub, spotfin	*Hybopsis monacha*	AL, GA, NC, TN, VA	Entire
Darter, bayou	*Etheostoma rubrum*	MS,	Entire
Darter, leopard	*Percina pantherina*	AR, OK	Entire
Darter, slackwater	*Etheostoma boschungi*	AL, TN	Entire
Madtom, yellowfin	*Noturus flavipinnis*	GA, TN, VA	Entire
Trout, Arizona	*Salmo apache*	AZ	Entire
Trout, greenback cutthroat	*Salmo clarki stomias*	CO	Entire
Trout, Lahontan cutthroat	*Salmo clarki henshawi*	CA, NV	Entire
Trout, Little Kern golden	*Salmo aguabonita whitei*	CA	Entire
Trout, Paiute cutthroat	*Salmo clarki seleniris*	CA	Entire

"Splitters" and "Lumpers"

by W. J. HOLLAND

Every true naturalist is called upon to exercise the faculty of discrimination and the faculty of generalization. His work trains him to detect dissimilarities on the one hand and likenesses on the other. His judgments as to likeness are expressed in the genera, the families, the orders, which he proposes. His judgment as to dissimilarities is most frequently expressed in his views as to species.

When the two faculties of discrimination and generalization are well balanced and accompanied by the habit of patient observation, ideal conditions are reached, and the work of the naturalist in classification may be expected to stand the test of time. But where, as is often the case, one of these faculties is exalted at the expense of the other, there are certain to result perversions, which will inevitably cause trouble to other students.

When a man cultivates the habit of discrimination to excess, he is apt to become, so far as his labors as a systematist are concerned, "a splitter." A "splitter" magnifies the importance of trivial details; he regards minute differences with interest; he searches with more than microscopic zeal after the little things and leaves out of sight the lines of general resemblance.

Huber, the celebrated naturalist, said that by patient observation he had come to be able to recognize the different ants in a hill, and, as one by one they emerged from their subterranean galleries, he knew them, as a man living upon a certain thoroughfare in a great city comes at last to know by sight the men and women who are in the habit of daily passing his windows. No doubt the critical eye can detect as great individual differences in the lower animal world as are to be detected among men. A student comes to apply himself with great zeal to searching out and describing these differences, and when he undertakes to say that because of them one form should be separated specifically from another he becomes "a splitter."

I recall an entomologist whose chief weapon of research was a big microscope. He would take a minute insect and study it until he was able to number the hairs upon its head. Then he would describe it, giving it a specific name. The next specimen he would subject to the same critical process, and if the number of hairs was not just the same, or a small wart was detected here or there, or a bristle grew in a place where a bristle did not grow in the specimen previously examined, it too, was described and a specific name was given it. It was as if a man, sitting and looking out on the throng upon Broadway, should resolve to give every individual a specific name and should declare he had seen as many species of men as he had seen men passing his window. The labors of such naturalists may be highly entertaining to themselves, but they are, to say the least, provocative of unpleasant feelings in the minds of others who come after them and are compelled to deal with and review their labors.

The "lumper," on the other hand, is a man who detects no differences. "All cocoons look alike to me!" he says. Any two moths which are of approximately the same size and the same color, are, by him, declared to belong to the same species. Questions of structure do not trouble him. General resemblances are the only things with which he deals. No matter if eggs, larvæ, legs, veins, and antennæ are different it is "all one thing" to him. His genera are "magazines," into which he stuffs species promiscuously.

The "lumper" is the horror of the "splitter," the "splitter" is anathema to the "lumper"; both are the source of genuine grief and much hardship to conscientious men, who are the possessors of normally constituted minds and truly scientific habits. Nevertheless, we are certain to have both "splitters" and "lumpers" in the camps of science until time is no more. "This kind goeth not forth" even for "fasting and prayer."

From The Moth Book *(1903), Doubleday, Page and Co., reissued (1968) by Dover Publications, New York. William Jacob Holland (1848-1932) was director of the Carnegie Museum 1898-1922 and also author of* The Butterfly Book *(1898). This and* The Moth Book *were for many years the chief field guides for North American lepidopterists.*

Travels in an Antique Land

A Participant in Field Museum's 1980 Egypt Tour Recounts Her Adventures

by MRS. ANTHONY L. PERRIN

photos by RILEY AND CORINNE JADWIN
Egypt Tour Participants

February 1. As though heading for the Mississippi, the captain of our DC-10 announces on the intercom: "We are going down to Cairo." But his blasé tone fails to put a damper on our excitement.

Egypt at last! "Welcome!" say smiling Egyptians, "Welcome to Egypt!" The long flight is forgotten. Aboard the bus to Hotel Mena House we pass goats, carts, donkeys, cars; some cars are wrapped in white bedspreads—our first mummies. The hotel balcony looks out on pyramids rising behind palm trees; but they can't be real; I must be dreaming!

February 2. Off to Cairo Museum. Two essentials: a heavy sweater and a guide—lucky to have both! Amazed at variety of Egyptian art: strength, tenderness, vitality. Lunch at Filfila Restaurant. . . . Unidentified objects in smoky cauldron, turns out to be delicious. Medieval Cairo in afternoon. Stop in bazaar: crowded, oriental. I order a gold cartouche; my name in hieroglyphs starts with a snake!

February 3. Bus to Medum, with its early pyramid standing alone in the desert. I climb up ladder into a black hole. It's a long way down, then up inside the pyramid. Glad to have a flashlight, but regret my touch of claustrophobia. Braver souls crawl backwards into the burial chamber of the newly discovered tomb. I admire, but do not follow. I see now what the brochure meant by "strenuous trip." We drive through green Faiyum, a region farmed since predynastic times. Admire oxen for their stolid patience as they plod in monotonous circles, drawing water. We board the *Rev Vacances*, the Nile River ship which is to be our home base for the next several days and nights. On the river bank we see egrets, camels, sugar cane.

February 4. A line of donkeys and boys wait for

Mrs. Del Nord, tour leader, and Mrs. Riley Jadwin before the Great Sphinx.

Snake charmer with cobra.

us at Bani Hasan. Black-clothed women carry glazed jugs of water on their heads. I ride to rock-cut tombs on a lively donkey. A boy joins me on the donkey's back, asking for candy. I teach him "Yankee Doodle." He belts it out immediately—very bright. Painted scenes in tombs are hard to see. Sail to Tuna el Gebel ("Rocky Sand"). In 300 B.C. tomb of Petosiris—rare mix of Hellenistic and Egyptian style. Walk across shard-strewn desert to baboon graveyard. Catacombs for ibises as well—Egypt is full of surprises. As the sun goes down, we reach Akhnaton border stela, edge of capital founded by the pharaoh whom Breasted called "the first individual in history." Nefertiti stands beside him on the lonely sand.

February 5. Nothing is left of Tell el Anarna, Akhnaton's city. After his death, palaces, gardens, and zoo were abandoned, then destroyed. The old Amon religion was reinstated and the experiment with monotheism eventually forgotten. High up in the rocks, we visit four tombs. Interesting question about Nefertiti arises: Did she ever reign as pharaoh? Hard to imagine a false beard dangling from her beautiful chin.

February 6. Awoke to see from the ship window a man standing so still in his skiff, he looked like a reed growing in the river. Behind him, mist rose from giant cliffs. All day we move up the Nile, our slow pace matching the timeless calm of life along the banks. Gaff-rigged feluccas slip into the current, women bend over their wash, children's galabeahs float in the morning breeze. There is no hurry—it has been like this since long before Greece began. The continuity running through Egyptian art is reflected in rural life. Though the river depth changes constantly, the Nile has no channel markers. Our ship makes its own meander within the river's larger one.

February 7. Awakened at 5:30, in bus by 6:00 and off for what many consider one of the greatest sites in Egypt: Abydos, center of the cult of Osiris, god of the dead. Everyone wanted to be buried there. If this was inconvenient, one's mummy could visit briefly. We had a picnic breakfast outside, by the temple. Three things to see: Osirion, being excavated; the temple of Ramses II, with splendid wall reliefs; and the best of all: the temple of Seti, Ramses's father. Bas reliefs look as though carved in butter, and the paint! It is shiny (no one knows why)—brilliant blues, greens, and rich terracotta—colors as bright as the land outside. Hypostyle hall strange to our Mies van der Rohe-trained eyes: 24 papyrus columns clustered like plants in a field (which they represent). Decorative as well as supportive. How wonderfully wasteful Egyptian architects were!

February 8. Up and out at 7:00 for the temple of Hathor, at Dendera. Hathor has cow's ears, sometimes horns, otherwise nice-looking—the Egyptian Aphrodite. Dendera is 1st century B.C., cluttered, *horror vacui*. Ladies have late Renoir figures, everyone sports dimpled knees. Upstairs is spicy representation of Isis bringing Osiris back to life. Other tours do not always visit this X-rated room!

Back to ship, lie in sun and ponder some Egyptian mysteries: Why do only prisoners, the lower classes, and prepositions face forward? Why did ancient Egyptian ladies think it was nice to wear cones of fat on their heads when going to a party? These dripped in the heat, gluing their dresses to them. But no one wore much in B.C. Was it warmer? We need sweaters.

In the evening, a lecture by Don Whitcomb, assistant curator of Middle Eastern archeology at Field Museum. He had just travelled from the Red Sea coast and gave us an in-progress report on his excavations at Quseir al-Qadim, a Roman and Islamic port.

February 9. First day at Luxor, the site of ancient Thebes, with its magically fresh colors of kings' tombs, variety of styles. Temple of Queen Hatshepsut the best, wonderful painting of expedition to Punt. Thanks to our guide, Del Nord*, we visit a private excavation, talk to archeologists. Tomb visits involve long descents into dusty rooms. Often we must cross a narrow bridge over an interior pit, meant to foil robbers, but didn't. Some of us climb a high ridge above the temple. Great view, looks like southwestern U.S. At noon, I bargain for two tangerines. Accosted by little girl carrying basket, in which, for a fee, I must put my rinds. More Egyptian ingenuity! I comply.

Next, the mortuary temple of ubiquitous Ramses, alias Ozymandias. Shelley's "shattered visage" is here. Goose-bumps rise with the familiar "I met a traveller in an antique land," which I read aloud in this place I never in my wildest dreams thought to see.

Shadows lengthen, we droop, but there is much more! Over the river and into horse-drawn, two-wheeled calêches—the Luxor taxis—and head for Chicago House. Its great library and lovely grounds are maintained by the University of Chicago's Oriental Institute. Director Lanny Bell shows us how what seem like hopelessly damaged hieroglyphs are finally read by painstaking plotting of photos and drawings. Admire the patience of Egyptologists—they rarely expect to finish projects within their own lifetime. Generous, this passing on of research—Egyptian continuity.

On to Karnak for "sound and light" performance. Huge crowd. As night falls,, Richard Burton reads ancient hymn to sun god. Didn't expect to like Karnak's superhuman scale, but find it wonderful. After dinner, we crawl to antique shop to buy shawabti figurine (servant for tomb). Neither dealer or shawabti very nice; decide instead to buy chocolate shawabti from Boston Museum. Thebes is like going to the Metropolitan, Louvre, and the National Gallery all in one day. Fall into bed in catatonic condition. Sleep surrounded by pharaohs, mostly Ramses.

February 10. Up at 6:00, ready for ferry to west bank, where dead—called "westerners"—

View from guest room of Mena House Hotel, Cairo.

Mrs. Del Nord, Ph.D. candidate in Egyptology, Department of Near Eastern Languages and Civilizations, the Oriental Institute, The University of Chicago. Mrs. Nord will also be co-leader of the Museum's February, 1981, Egypt tour, her fifth since the tours program was initiated.

Abu Simbel

were always buried. Moneychangers, hawkers of necklaces and 20th-century scarabs come aboard. A walking emporium parades huge pillar of tennis hats on top of his turban.

Quick stop at Colossi of Memnon—bad shape, looks better from back. Three boys race camels past us as we drive to tombs of nobles. These tombs are better than those of the kings—full of genre scenes: gardens, harvest, sailing, lively insight into daily life. The best tomb has undulating rock ceilings painted with grape vines; it's like being in an arbor. See five tombs, like them all. But to get there we pass through an impoverished village. Children run barefoot over litter; on almost every small back a baby is strapped. More than time separates ancient and modern Egypt.

After lunch we trot off in a calêche for Karnak. Shiny brass hands of Fatima hang from the harness. Lanny Bell takes us into French archeological dig: a lovely Middle Kingdom temple, with reliefs that look as though cut from ivory. Karnak was under construction for 2,000 years—Must try and be more patient with home projects! I feel dwarfed. Champollion wrote in the early 1800s that the ancient Egyptians "conceived like men a hundred feet high." True.

February 11. The galabeahs ordered 24 hours ago (we were measured in the middle of the street) have been delivered by Mr. Moharib. "*Shukron*, thank you!" They look wonderful! Sorry to leave Luxor. It has a gentle English holiday atmosphere. The ghosts of all the visitors who brought their ill health or their curiosity to be cured by the magic of Thebes float around the old winter palace. Their footsteps echo on the sidewalk, while the loveliest sunsets in Egypt redden the river and the necropolis.

We're off for Esna, the main camel market of Egypt, to look at a Ptolemaic temple. Walk through the streets lined with open shops; in one a man irons clothes with his *feet*! The temple has the greatest variety of capitals anywhere. A little frog perches on one. By 100 B.C. the artists were out of touch with the old ways, the iconography was confused—very hard on the tourist who has just gotten the hang of it.

In the afternoon we reach Edfu, temple of Horus. Except for granite statue of god (very snobby face), don't like temple, which is heavy, cold. Horus and Hathor had sacred marriage. Saw each other same time each year at Dendera. I drive calêche back to ship, but on the way get stuck in a sand pile while avoiding a truck. Our ship's chef has created an Egyptian feast. Egyptian folk music after dinner, with a Nubian singer: the fantastic beat pulls us onto the dance floor.

February 12. We land at Kom Ombo, temple of the crocodile god. Mummified crocs in chapel (no comment!). Site too good for occupants. Our last day on ship, and we enjoy the sun on our way to Aswan. Very pretty; river split by islands. We board feluccas for ride to museum. There is no wind, so we are rowed with long, bladeless, impractical oars. Are sails made of old pajamas? The air of Aswan has a special quality, just as old guidebooks say; feel marvelous. Steep climb to tombs. Full of huge pits, no railings, and, ugh!, some human bones in Nubian baskets. But never mind! Wall paintings of dancing girls and a relief of a dog—fine as a Degas—compensate. Outside, we gaze down at Aswan, across a Nile dotted with feluccas that float like feathers between the islands. We visit a bazaar, always fun. Even late at night bazaars are safe; nothing more sinister than a long-haired goat will follow you.

February 13. We bid goodbye to the ship. Swallows fill the morning air as a bus takes us to famous dam and granite quarry, source of all stone for obelisks (a long way to Cleopatra's Needle in Central Park!). Arrive at airport for flight to Abu Simbel. Push, shove, we are surrounded by at least five languages. Abu Simbel is very hot; Lake Nasser is glassy, weird, floating over desert. Will anything ever grow here? Dam not 100% success, but redeemed temples are.

February 14. Having flown back to Cairo, we are off to Saqqara, favorite of Egyptologists. Here is Zoser's pyramid, the earliest large stone building in the world. Here are reliefs and paintings of such high quality they make everything else look clumsy and cluttered by comparison. Everywhere, repeated shapes create such a strong sense of rhythm, you feel yourself bending with the frieze of dancers, walking behind the solemn cattle, or climbing the riggings with an ancient sailor. You can almost hear the fish plop beneath the bows of little boats just like the ones we have been passing all week. A real Sahara sandstorm comes up; our driver turns into a weatherman: "Before rainy, must be windy. After rainy, no more windy." He was right.

February 15. Pyramids don't look right surrounded by crowds; they are architecture meant for isolation. Best to visit them early in the morning, or late at night; but never, *never* on Friday—the Muslim holy day. Half of Cairo comes then to the pyramids with picnics. Do not think this is what old Cheops had in mind.

Our great treat is a private view of the funerary boat uncovered in 1954. Hassan Nassif, director of antiquities at Giza, shows us the enormous, double-ended craft. Built entirely of cedar from Lebanon, lashed together with hemp (no nails), it has been painstakingly rebuilt. Now, under its protective sky of glass, it seems to float once more, ready to take a pharaoh proudly up the Nile. A fantastic sight, strangely moving.

Mrs. Jadwin tries out Egypt's age old mode of transportation.

February 16. "Cairo itself cannot properly be called a health resort." Mr. Baedeker, you should see it now, with a density of over 250,000 people per square mile in some sections. Every 20 seconds a baby is born. The Nile's green strip seems far away as we elbow our way through Tahrir Square and back to the museum. A good place to begin and to end a trip to Egypt. Now the halls are filled with old friends: Tuthmose, Amenhotep, strange, flabby Akhnaton, and nice Hatshepsut. For the last time we admire their elongated toes and the delicate feet that walk with such confidence and grace. A single stone hand rests on a shoulder and says all there is to know of tenderness.

Now there is packing to do, and a shift of gears to ready ourselves for the long trip home.

February 17. Thousands of feet below us, Egypt slips away. Three weeks ago it was sand and a river, a list of gods and pharaohs, an itinerary through unknown territory. Now we see it, "appearing and shining, far off yet close at hand."—Akhnaton's words. This trip and Del Nord have opened up a whole country for us. Like Howard Carter, King Tut's discoverer, we have seen "wonderful things."

FIELD MUSEUM TOURS

Courtesy Patson Travel, Inc

India: Taj Mahal

FIELD MUSEUM TOURS 1981 program offers Members a choice selection of interesting and fascinating destinations under the leadership of Museum scientists. Each is designed with the aim of expanding your knowledge and understanding of the region visited, as well as to enhance your pleasures of travel. Tour groups are small (about 25) and your travel companions are people with similar interests. A tour escort accompanies each group to care for your every need and to oversee the operational aspect of the trip. Orientation sessions before departure give you a chance to clear up any questions about the itinerary, and to meet the lecturer and your co-travelers.

Papua New Guinea

May 1-17

A land untouched by time...of rain forests and coral-encrusted coasts...of butterflies and bamboo bands, birds of paradise, and orchids. It is a land of a thousand tribes, each different and distinct, each following age-old traditions...a brand new land, yet inhabited by man for over 50,000 years!

ITINERARY:

May 1: Early morning departure for non-stop flight to Honolulu. Transfer to Ilikai Hotel. Balance of day and evening at leisure. **2:** Early morning departure by Air Niugini. A day is lost as we cross the International Date Line. **3:** Morning arrival at Port Moresby to connect with flight for Madang. Transfer to charming Madang Resort Hotel. Remainder of day at leisure. **4:** Morning transfer to cruise boat for tour of Madang harbor. On Siar Island we enjoy a bountiful barbeque lunch while entertained by a tuneful bamboo band. An afternoon drive takes us along the boulevards of Madang township. **5:** An idyllic drive this morning, up north coast road past plantations and coastal villages, with frequent stops. Lunch at Bogia Hotel, then a Ramu River canoe trip. Late afternoon we board our trim, newly refitted cruise ship, *Melanesian Explorer.* 6-9: Cruising the Sepik River. The Sepik forms a natural highway for villages along the banks and for the immense water-oriented wildlife populations that reside here; we glimpse the stirring activity as we glide along. **10:** Morning departure by charter flight from Ambunti on the Sepik to Mt. Hagen, Western Highlands commercial center. Overnight at Minj Hotel. **11:** We visit the spectacular Nondugl Sanctuary, Papua New Guinea's highest bird sanctuary, in Baiyer River Valley. **12:** Morning visit to Paree Gap and village for closer look at unique gardening technique on steep mountain slopes and for views of spectacular Chimbu Gorge. Afternoon visit to Chimbu Province villages. Overnight at Minj Hotel. **13:** More motoring adventures. We pass the villages of Sina Sina, Chuave (limestone caves at the foot of Mount Elimbari are traditional burial grounds), and Watabung on our way to the summit of the Daulo Pass; there we take in panoramic view of Goroka Valley coffee plantations. Overnight at Bird of Paradise Hotel. **14:** Morning tour of Goroka and of McCarthy Museum. Depart Goroka in afternoon by Air Niugini for Port Moresby, with transfer to Travelodge. **15:** Port Moresby high points featured on our morning tour are the National Museum, the University of Papua New Guinea, and the National Capital District. Free afternoon to pack or purchase last minute souvenirs. Late evening departure. We regain the day we lost en route when we cross the I.D.L. Noon arrival in Honolulu and transfer to Ilikai Hotel. Balance of day at leisure. **16:** Afternoon departure from Honolulu for overnight flight to Chicago. **17:** Early morning arrival O'Hare Airport. The cost of this tour is $4,461, including a $300 contribution to Field Museum. Possibly the most stimulating single travel experience the present world has to offer. Dr. Phillip Lewis, curator of primitive art and Melanesian ethnology, our Field Museum lecturer, and Jeff Eversidge, a well known authority on the Sepik River will be your guides. Early registration is suggested. A more detailed itinerary is available on request.

Courtesy Special Expeditions, Inc

Baja California: surfacing whale

Baja California

January 31-February 14, 1981

LESS THAN 50 MILES SOUTH of the U.S.-Mexico border begins a peaceful world of subtropical beauty—the Sea of Cortez (Gulf of California). Some 600 miles long, but generally less than 95 miles wide, this gulf is a paradise for marine vertebrate and invertebrate life—and for those of us who enjoy its study. Field Museum members will have the opportunity to know this sea of wonders in a 15-day voyage that will all but complete the circumnavigation of the peninsula of Baja California.

Beginning in the north end of the gulf at Puerto Penasco, we will spend 7 days exploring the natural history of the Sea of Cortez, examining consequences of terrestrial aridity and aquatic richness, observing changes as one moves from the warm-temperate north end to the subtropical surroundings of La Paz and Cabo San Lucas. In the Canal de Ballenas—the Channel of Whales—we may catch sight of the second largest of the great whales, the finback. We will also see countless sea lions, pelicans, cormorants, boobies, and frigate birds. Walking tours on several islands will afford first-hand experience with the flora and fauna. Lovers of marine life will have ample opportunities for snorkeling, fish watching, or just beach walking. After a morning in La Paz, the fabled 150-year-old capital of the territory of Baja California Sur, our last full day in the gulf will be divided between exploration of Isla Espiritu Santo—"the most beautiful island in the gulf," and a search at Gorda Banks for the giant plankton-eating whale shark, which may reach 60 feet in length.

A moment of high excitement will be the rounding of the spectacular lands end at Cabo San Lucas, marking our entry into the open Pacific and offering the chance to contrast the Sea of Cortez with the outer coast of Baja, bathed in the cooler waters of the California Current.

A main objective for the outer coast segment of the tour is to visit the breeding and calving grounds of the California gray whale. This species may travel more than 11,000 miles annually between winter calving grounds in Baja California and summer feeding grounds as far north as the Chukchi Sea—the longest migration of any mammal. Once hunted nearly to extinction, with protection the species has rebounded, and the current population is estimated at 15,000. We will first see gray whales in Magdalena Bay, astride the boundary between the subtropical waters through which we have sailed and the cooler warm-temperate waters to the north. In Laguna San Ignacio the main attraction will be the gray whales, which we should be able to observe at very close (but safe) range. Equally attractive will be the diverse bird life of the fringing mangrove lagoons and marshes. At the island group of San Benitos we will meet among the largest (3 tons) of all pinnipeds, the northern elephant seal. After a visit to the rookeries of Isla San Martin and a final chance to see the spouts of migrating whales, we end our 1,400-mile voyage in San Diego.

The tour will be led by Dr. Robert Karl Johnson, associate curator and head of the Division of Fishes at Field Museum. A graduate of Scripps Institution of Oceanography, Johnson has had considerable field experience in the Gulf of California and along the outer coast of Baja California. Special Expeditions, a division of Lindblad Travel, operators of the ship to be used, will provide several additional naturalists whose expertise will further enrich our experience. Our home for the voyage is the one-class, fully air-conditioned 143.5-foot *MV Pacific Northwest Explorer,* built in 1980, registered in the U.S., and fully certified by the Coast Guard. All 39 cabins are on the outside, and all have private facilities.

Cost of the Baja tour varies with the type of stateroom accommodations, according to the following schedule: lower deck, double cabin: $2,100; upper deck, double cabin: $2,380; main deck, double cabin: $2,520; upper deck cabins "Carmen," "Catalina," "Cedros," and "Magdalena": $2,800; bridge deck cabins: $2,800. Single accommodations are also available upon request. The above prices include surface transportation from Los Angeles to Puerto Penasco, Mexico, and San Diego to Los Angeles and transfers. Transportation between Los Angeles and Chicago (or other point of origin) is *not* included. Upon receipt of reservations, round trip air tickets (between Chicago and Los Angeles) will be purchased at the lowest available rate. Early reservations are advisable for lowest air fares. Tour participants may elect to make separate air arrangements. Deadline for reservations is October 31.

Egypt: Karnak

India

January 21-February 12

NOW IS THE TIME to take that long-awaited tour of India—a country that must be experienced to be believed. The sheerly rising, snow-peaked Himalayas form a backdrop, unreal in its wall-like abruptness, to the valley of Kathmandu. Ancient temples freeze still living theologies into stone; the eloquent marble geometry of the Taj Mahal, the many-armed deities of Hinduism, and the serene face of the teaching Buddha form a living link with the past.

ITINERARY:

Jan. 21: Depart Chicago, O'Hare Airport via United Airlines. Gateway city is New York. **22:** Arrive London. Overnight at Hotel Sheraton Heathrow. Day at leisure. **23:** Air India flight to Delhi. Overnight at Maurya Sheraton Hotel. **24:** Day at leisure. Late afternoon visit to Delhi Zoo. Evening cocktail reception. **25:** Morning excursion to Sultanpur Bird Sanctuary. Afternoon sightseeing of Old and New Delhi. **26:** Republic Day spectacular celebrations—India's greatest national festival. Special seats reserved for our group. Remainder of day at leisure. **27:** Early morning flight. Accommodations at Kanha National Park Forest Rest House. **28:** Full day at Kanha Park. **29:** Morning exploration of Kanha Park on elephant back. Evening flight from Nagpur to Calcutta. Overnight at Airport Hotel. **30:** Early morning flight to Jorhat. Excursion to Kaziranga Park. Overnight at Forest Lodge. **31:** Full day to view at close range wildlife of Kaziranga Park on elephant back.

Feb. 1: Flight from Calcutta to Kathmandu. Overnight at Hotel Oberoi Soaltee. **2:** Morning flight over Mount Everest and Himalayan region. Afternoon tour to Godaveri Botanical Gardens. **3:** Flight from Kathmandu to Pokra. Accommodations at Fishtail Lodge on shores of Phewa Tal; beautiful view of mountains from the lake. **4:** Flight from Pokra to Kathmandu. Hotel Oberoi Soaltee. Afternoon sightseeing tour of the city. **5:** Mid-after-

For more exciting tours see page 26.

New Guinea: masked dancer

Iroquois Sash Inspires Weaver

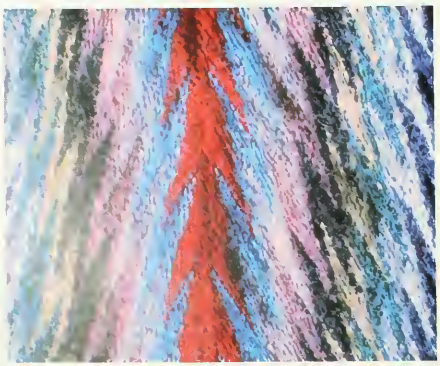
Museum Visitor Duplicates Exhibit Specimen

IT IS BOTH COMMONPLACE and natural for museum visitors to express admiration for the native works of art that they see in the halls featuring ethnological materials. But seldom is a visitor so intrigued that he or she comes back to study the same article time and time again, takes notes on it, perhaps makes sketches, or even photographs the piece with the intentions of attempting to faithfully duplicate it with one's own hands.

This was the case, however, with Miss Mae Louise Ring, of Dutton, Michigan, who has had a longstanding interest in textile crafts of Native North Americans.

Several years ago, Miss Ring took special notice of a colorful sash worn about the body of a mannequin representing an Iroquois man in case 12, Hall 5, the hall of Indians of Eastern North America. Acquired by the Museum from an upstate New York locality in 1926, the Iroquois sash (cat. no. 155666) is woven of wool strands variously colored red, blue, green, and yellow. The sash, says Miss Ring, was the finest example of fingerweaving she had ever encountered. As an experienced weaver, her decision to duplicate the piece was perhaps not remarkable, but the time, patience, and care which her project ultimately entailed is cause for admiration.

In duplicating the piece, Miss Ring used 286 fragile, single-ply wool strands. These had to be spliced, and the constant handling of



Left: *Detail of Ring's reproduction of Field Museum's Iroquois sash #155666 shown on the mannequin at right. The sash was fashioned from 286 single-ply wool strands.*

Right: *Life-size mannequin in case 12, Hall 5, representing Iroquois man, wears sash (cat. no. 155666) described by Mae Louise Ring as "the finest example of fingerweaving I have ever encountered." The sash was acquired by the Museum in 1926.*

Mae Louise Ring with her hand-made sash. Ring is accomplished in a variety of Native American textile crafts and is a potter as well. She has designed and made clothing for diorama exhibits of Native American culture in the Grand Rapids Public Museum, Michigan.

the strands, she remarks, caused a problem in maintaining tension for pattern shape—a difficulty that any fingerweaver is familiar with. Her finished sash is 41 inches long (plus extremely long fringes) and 8 inches wide; nearly 70 hours were required to complete the weaving. The only tools used, of course, were her own fingers.

Such sashes may have made their first appearance about A.D. 1500, Ring's research reveals. "The first use of this type of sash," she notes, "was functional, as for securing clothing, carrying burdens, for wrapping bundles, and as trade items. Later they were created for decorative purposes; the position on the body where the sash was worn and the manner in which it was secured often had a special symbolic significance. Now such sashes are used as part of traditional dress and in costumes for dances and other ceremonial functions, the colors and the pattern varying according to the dancer's place of origin." □

Also in Hall 5 are the examples of fingerweaving shown on these figures. Top: Winnebago, with wool midriff sash (#155667) in blue, yellow, and lavender on red background. Bottom: Sauk and Fox with red, blue, and purple midriff sash (#155628) also of wool. Both pieces were acquired by Field Museum in 1926.

Dear Field Museum

SEVERAL MONTHS AGO, the shelves of grocery stores across the nation began to carry dinosaurs—pictures of them, at any rate—on boxes of Life Cereal, manufactured by the Quaker Oats Company.

The reverse side of the boxes carried brief descriptions of these ancient behemoths, as well as portraits of them, and readers were invited to write for further information to Field Museum, where dinosaur reconstructions are some of the most popular exhibits. From among the many hundreds of letters received (nearly all from children), the following were selected for *Bulletin* readers to share with us:

Dear Field Museum: I am 10 years old and in the 5th grade. I want to know how you put dinosaur bones together and, also how do you make your dinosaur bones stand without falling? I live in Twin Falls, Idaho. Some day I want to come and see your Museum. I love studing dinosaurs. In school I have studied it 4 times We also made a notebook on dinosaurs. Truly yours, T.J., *P.S. Thank you. Twin Falls, ID*

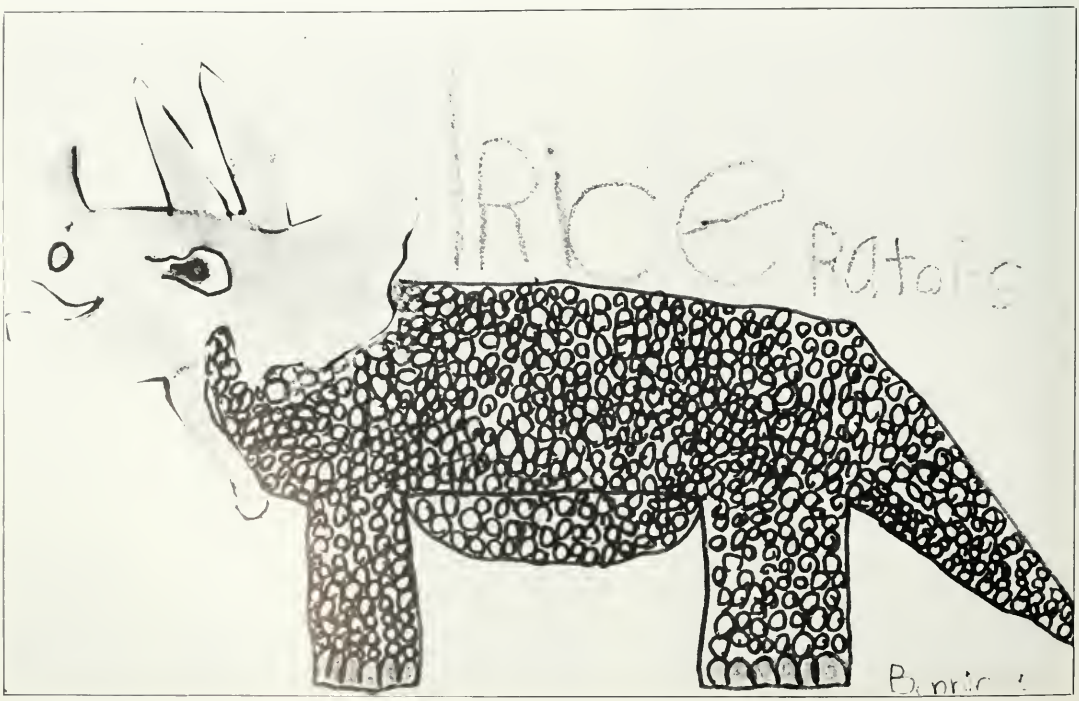
Dear Field Museum Please send me a example of a Prehistoric Anamals. N.J., *Peru, IN*

Dear Sirs: I would like to know why the dinosaurs died. I would also like to know what the weather was like back then. I would also like to know which dinosaur was the biggest and how big. I would also like to know which dinosaur was the smallest and how small. How much the biggest dinosaur weighed and the smallest. How many different kinds of dinosaurs there was back then. Yours Truly, T.W., *Cincinnati, OH*

Dear to whoever it may concern, I'm writing to you because I want to be smart and to know about dinosaurs. I am 10 years old and in 4 grade. And I saw your thing on the Life cereal box. please send me information. Sign, S.C., *San Antonio, TX*

Dear Field Museum, I get Life sometimes and saw the dinosaurs. In my class we've been studying about them. So I'm righting to you so I can have some information. I have to go now! bye!! L.G., *Pittsfield, ME*

Dear Sir, I would like all the information you can send me on dinosaurs, and fossils. And if you have any great cowboys. Please send to: P.M., *Bridgeport, OH*



Dear Field Museum, I am fasinated about Dinosaurs so please send me as much information as you can aspically the Tryonasaurus Rex, I like him the most. Thank you. Your Dinosaur Lover, R.B., *Oklahoma City, OK*

My name is R.J. and I'm 16 years old. I would like to know more information on your museum. So can you please send me lots of information on the Reptile called the Pteranodon I would love that very much. I like animals from 225 to 65 million years ago. So can you Please send me tons of information on the Pteranodon Please, and can you also send me information on Man eating Dinosaurs. Thank you. R.J. Jr., *North Providence, RI*

Dear Field Museum I need some information about DINOSAURS. I'd be really happy if you could deliver some information on dinosaurs in five weeks please. From M.P., *Alexandria, VA*

Dear Field Museum, I would like to have the hole-works of information that you have on dinosaurs! I think they are neat! Thank you, sincerely, M.M., *St. Cloud, MN*

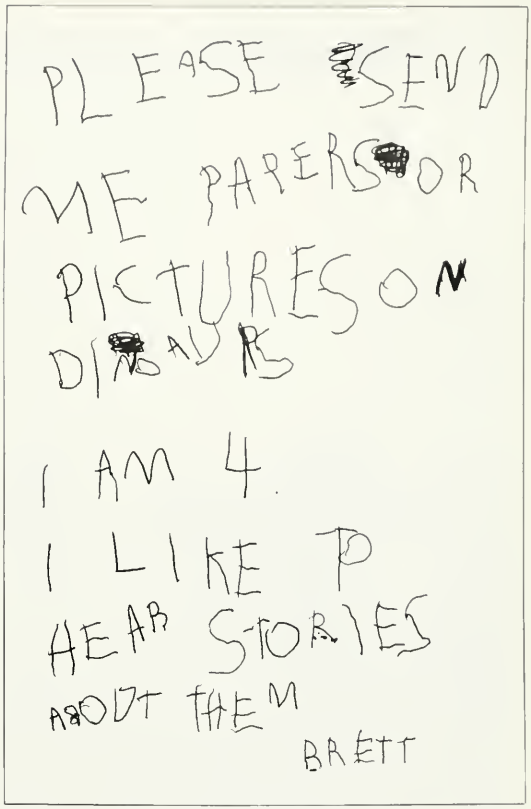
Gentlemen, I'm sort of a dinosaur freak who would like to know a little more about them. What I would like to know is what they were because I order a magazine called Ranger Rick *and it . . . told some ideas that dinosaurs could be warm-blooded, active animals. I would also like to know about what they ate and where most of them lived. If there were any people of existance at that time. I saw your add on Life Cereal boxes. If this is any trouble here is my name and address:* J.S., *Council Bluffs, IA, age 9. Please write information back soon!*

Dear: Field Museum I got the letter. I can't go to see you because i'ts to far. But when I get big I want to work at your Museum. I'm sending you a picture of triceratops and the bones of him. I got the pictures of dinosaur on the back of the Life cereal box of Meat-Eating Dinosaurs and Plant-eating Dinosaurs. I love Dinosaurs. I'm 7 years old. Do you have fossils of tyrannosaurus Rex? and triceratops? If you did I would like to see them. Could you send me pictures of Dinosaurs M.S., *Thank you! New Ringgold, PA.*

Dear Field Museum I've gotten your dinosaurs on the pakage of Life. I've always liked dinosaurs when I was real young. I still do, they're my hobby. When I grow up I'm going to be a palentologist. Well, I would like some information pictures, and offers through the mail, if it is ok. I have dinosaur books, puzzels, pictures games, flashcard, and even lots of rubber dinosaurs. Please give me offers, pictures and adult info. (I know already the names of all the Dinosaurs and groups) M.N., *11 years, Thank you. Ramona, CA.*

Dear Sir, I have studied dinosaurs for 3 years now I know many things about them My friend Tracy gave me your address if you have any free information about dinosaurs that I might not know please send it to me. Your friend, P.R., *Hindsville, AR.*

Dear Sirs: My name is D.Z. I'm in the 7th grade and entering the Science Fair at school. I'm writing to receive information on Dinosaurs. Which theory have you discovered to be true about how the dinosaurs became extinct? Is it true that the flying reptiles of that time are the ancestors of our modern day birds? Was the plant life in that time of the dinosaurs similar to plant life of today? If not what do you think it was like? I would appreciate it if you would send to me, as soon as possible, any literature or pamphlets etc. that you have on this subject. Thank you, D.Z., *Cross Plains, WI*



Please send me papers or pictures on dinosaurs I am 4. I like to hear stories about them. B.R., *Idaho Falls, ID*

Dear Friend, How are things? I'm okay. I was eating breakfast and I was looking on a Life cereal box and seen some Dinosuros (Very interesting.) Could yah send me some pictures or information about this place. I'm a type of person that likes artifacts and the past. Well I must close. See you soon. Write back when have time. Good luck and God bless you. Your very best friend, R.V.L., *15 years old. Candor, NC*

Dear Field Museum, My name is D.O. I would like to have more information on meat eaters and plant eating Dinosaurs, and Fossils. I am very interesting on Dinosaurs. When you write to me my address is: D.O., *Vinton, LA*

Dear Sirs, I would like as much information as poss'ble on the prehistoric birds, meat-eating dinosaurs, the prehistoric amphibians, and the plant-eating dinosaurs. It is very important because I'm a science lover and am hoping I'll be a scientist. Sincerely yours, T.E., *P.S. Try and rush them! Biloxi, MS*

Field Museum. I want to know more about dinosaurs and other prehistoric animals of long ago. Because I want to be a scientist when I grow up. So that I know a lot about them. I like to read books about them too. And I like to read a lot of books. And I want to know why they died. Mammals are another prehistoric animals and why did they die? Signed R.S., *Memphis, TN*

Edward E. Ayer Film Lecture Series

October and November

James Simpson Theatre
Saturdays, 2:30 p.m.

THE ENTRANCE TO SIMPSON THEATRE is conveniently located inside the west entrance. This is of special interest to the handicapped, for the entrance is at ground level, with all steps eliminated. The west entrance also provides free admission to the theatre. Access to other Museum areas, however, requires the regular admission fee (except on Fridays) or membership identification. The film/lectures are approximately 90 minutes long and recommended for adults. Members must bring their membership cards for priority seating privileges. Doors open at 1:45 p.m. When the theatre has reached full seating capacity, the doors will be closed by Security personnel in compliance with fire regulations.

Browsing deer on spacious lawns of Warwick Castle, in "England," October 4.

October 4

"England" by Howard and Lucia Meyers

This film takes you inside the incredibly lavish treasure houses of England—reminders of an adventurous past: Warwick Castle, Windsor, Barnard Castle, Wilton. The rich, romantic palaces of old England bid you a royal welcome.

October 11

"The Great Smoky Mountains" by Richard Kern

The rugged old mountains of Southern Appalachia are home to a diverse flora and fauna. Join Richard Kern as he explores the beautiful wilderness.

October 18

"Charming Vienna" by Andre de La Varre, Jr.

Take a journey back to the city of his boyhood with Andre de La Varre. Visit the exquisite Habsburg Palace of Schonbrunn, watch the training of the world famous Lipizzan stallions and experience the excitement of Vienna at night.

October 25

"Swiss on White" by John Jay

John Jay's entertaining and humorous presentation visits the most popular and challenging ski runs in the Alps. Go to Murren and witness the roped race, San Moritz and the famous Cresta run, Kolstens with its cross country skiing and finally, summer skiing at Zermatt.

November 1

"Sweden" by Dick Reddy

Discover the warmth of Sweden with a visit to Stockholm followed by midsummer celebrations at Mariefred, glorious Gota Canal trip to Gothenburg and a trip to the Island of Gotland, north of the Arctic Circle.

November 8

"Greece" by Sherilyn and Matthew Mentes

An intimate look at a land as ancient as the temples at Delphi and as modern as the skyscrapers of Athens. The Mentes take us from the islands, punctuating Homer's "wine-dark sea," to the cloud-covered peak of Mount Olympus.

Racing 70 miles per hour down the famous Inferno Race Course, Murren, Switzerland, from "Swiss on White," October 25.

November 15

"*Paris*" by Kathy Dusek

A journey down the Seine—the river of Paris. Highlights include Paris life centering around the Seine, the beautiful Cathedrals of Notre Dame and Saint-Chapelle, and the sharp contrast of the modern world with the remains of the past.

November 22

"*Peoples of Romantic Europe*" by William Sylvester

Learn about the peoples of Germany, Switzerland, Austria, and Yugoslavia. Their character and traditions are explored and enrich our visit to their countries.

November 29

"*Ireland*" by Robert Davis

A peek into the Irish past, a walk through bustling Dublin and a visit to the rural countryside highlight this film trip to Ireland.

Black bear pauses to pose in "The Great Smoky Mountains," October 11.

Touring horse caravan in Ireland, from "Ireland," November 29.

OUR ENVIRONMENT

Illinois Mud Turtle Still off Endangered List

The Illinois mud turtle will not be listed as an endangered species at this time, the Department of the Interior's U.S. Fish and Wildlife Service has decided. The agency's decision was based on new data received from the public in response to a proposal which would have afforded the dark brown turtle areas of critical habitat in Iowa and Illinois and other protection under provisions of the Endangered Species Act.

Information compiled during the public comment period and from meetings held in the two states by the agency following publication of the proposal increased the service's knowledge of the turtle's range and population. The additional data made available to the agency indicated the turtle is more numerous than had been assumed but confirmed that its habitat has been reduced. The service will continue to study the status of the Illinois mud turtle, officials said.

The Iowa area proposed as critical habitat for the turtle and known as Big Sand Mound is owned by Monsanto and Iowa-Illinois Gas and Electric Company. Monsanto's expanding Muscatine herbicide factory is located there, and the utilities company is constructing a generating station nearby.

The two companies have fenced off a 400-acre tract of land in Big Sand Mound and proposed it be managed as an ecological preserve by an advisory group of scientists and conservationists interested in preserving the area's unique plants and animals, including the Illinois mud turtle.

Fish Employed to Monitor Water Purity

A West German city has enlisted six Nile elephant fish to check out whether it's safe to drink the water. Each Gnathonemus fish (actually, a two-inch, black-striped goldfish) works unstintingly around the clock, two weeks straight, to provide a continuous check on Göppingen's water purity. Its unique job qualifications: a talent for detecting small amounts of metal contaminants and the ability to emit electric impulses.

City engineers simply plop one into an aquarium rigged with electrodes connected to a monitoring panel at utility headquarters and relax until the fish sounds a pollution warning by dropping its impulses under 200 a second. (An elephant fish in unpolluted water normally gives off over 1,000 impulses.)

Endangered Eaglet Survives Storms

On the morning of July 17, biological technician George Stapleton, of the U.S. Fish and Wildlife Service, observed an immature bald eagle soaring around Little Creek Reservoir on Crab Orchard National Wildlife Refuge, Carterville, Illinois. Similar events are occurring elsewhere in the upper Midwest at this time of year, so what makes this eagle so special? The bird is special because it's the first eagle ever to be hatched and reared on the refuge; moreover, the nest is only the second successful nest in Illinois in the past 37 years.

Efforts to produce the eagle began in early 1973 when a pair of eagles selected a snag in the reservoir and constructed a nest. Work on the nest ended abruptly when the tree fell during a storm in 1974. The eagles selected another snag nearby and again began building a nest. The eagles appeared to be interested in the nest throughout the winter months but usually joined the spring flights to northern states.

However, in the spring of 1979, things were different. Seemingly, the eagles were about to carry the nesting activities to completion. From a vantage point a quarter of a mile from the nest, technician Stapleton checked the nest through his scope almost daily. He was convinced the eagles were incubating during the entire month of April. For some unexplained reason, though, the eagles abandoned the nest and left the refuge on May 2. Observers were disappointed when they failed to see any sign of an egg or eaglet remains in an aerial survey over the nest a week later.

The eagles returned to the area in November 1979, and again began defending territory around the nest. Biologists were excited by the obvious seriousness of the nesting activity when on March 8, 1980, the pair was observed mating near the nest. By late March, Stapleton thought the eagles were incubating an egg. On April 25, he noticed a change in the behavior of the eagle sitting on the nest and suggested it might be caring for a young bird. Suspicions were confirmed on May 8 when an eaglet was observed moving about on the edge of the nest. Both proud parents were in attendance.

With the parents providing an ample supply of fish, the eaglet continued to grow at a rapid rate. The young bird had feathers and was close to the flight stage. On the evening of June 28, a severe thunderstorm with 100 mile-per-hour winds passed through the area. The tree was blown down and the nest sank beneath water. The young eagle apparently survived the storm and falling trees and was spotted sitting on a log near the stump that had once supported the nest tree.

Biologists thought the young eagle had the best chance for survival—perhaps 50-50—if left alone under the care of its parents. A check of the area on July 1 indicated the parents were still caring for the young bird and it appeared to be in good condition.

On the afternoon of July 2, another severe storm moved through the area, creating severe damage to nearby communities and hundreds of trees on the refuge. The young bird, apparently conditioned to such abrasive powers of Mother Nature by now, survived the storm without harm. Technician Stapleton and the refuge staff were elated when the eagle finally took to flight on July 17.

Several questions remain to be answered: Will the eagles return to the area again next year? Will they select another tree and continue their nesting attempts? Can they be encouraged to select a live tree on land or perhaps a man-made nesting structure over the water? The refuge staff will make the area as attractive as possible to eagles. Optimistically, eagles may adopt Crab Orchard Refuge as a permanent nesting site and produce young in southern Illinois regularly.

Illinois Air Quality: A Mixed Report for 1979

Air quality over Illinois was a mixture of good news and bad news during 1979, according to the Annual Air Quality Report recently completed by the Illinois Environmental Agency. The report was compiled by the IEPA's Division of Air Pollution Control Ambient Air Monitoring Section. It is based on data compiled from the Division's air monitoring network consisting of 316 samplers throughout the state.

On the good news side, levels of ozone (O_3) and carbon monoxide (CO) were definitely lower during the year. However, on the bad news side of the ledger, levels of sulfur dioxide (SO_2), particulates (soot, dust, etc.) and nitrogen dioxide (NO_2) were higher, the report shows.

Dave Kolaz, manager of the section, said, "Air pollution is a highly variable phenomenon relying on the interplay of a variety of conditions. Foremost among these are the weather, geography, and economics. Weather conditions involve atmospheric stability, wind speed and direction, precipitation, solar radiation, and temperature. It's important to know the geography—whether the area is urban, rural, valley or plain. Economics considers such things as the concentrations of industries, boom or recession times, and whether it's a weekday or the weekend. All of these things are contributing factors to

the quality of the air we breathe in this state. These variations often can be seen as a pattern of daily, seasonal or longer range basis."

The report shows that trends established over the years for four of the seven major air pollutants over the past years were reversed during 1979. Ozone and carbon monoxide, which had been increasing, decreased, while particulates and sulfur dioxide, which were decreasing, increased.

In general, ozone levels were much lower in 1979 than in the previous three years. For the first time since monitoring began in 1974, none of the 43 stations in the network registered levels above .20 parts per million (ppm). The highest hourly average for the year was .186 ppm at Waukegan. That monitor also recorded the greatest number of days above the federal standard of .120 ppm, with nine days. Edwardsville had the greatest number of hours exceeding the state standard of .080 ppm, with 176.

On 60 of the 153 days in the ozone season at least one city or area was placed under an ozone advisory when levels exceeded 70 parts per billion (ppb) for a two-hour average and weather conditions were such that the levels were expected to re ccur the following day. This compares to 88 days in 1978 and represents a decrease of 18 percent. Edwardsville led with 37 days under advisory conditions. This is 23 percent lower than in 1978, when Marion was under advisory conditions for 72 days. In 1979 Marion had only 23 advisory days.

There was only one Yellow Alert issued in 1979, compared to eight in 1978, when levels of 170 ppb were exceeded. The single Yellow Alert was declared on July 21 for Waukegan. The Yellow Alert is issued when ozone levels reach 170 ppb for a one-hour average and conditions are such that reccurrence is expected the following day.

Of the nine sites monitoring carbon monoxide only three registered violations of the eight-hour standard of 9 ppm. These occurred in Chicago, Calumet City, and Moline. The greatest number of excursions were recorded at the State Office Building in downtown Chicago with 59. This is a decrease of 30 percent over 1978, when 84 excursions occurred. This site also had the highest eight-hour excursion of 16 ppm and the highest one-hour average of 24.3 ppm.

The statewide average for particulates reversed a downward trend in 1979 when the statewide average was 74 micrograms per cubic liter (ug/m^3) as compared to 70 ug/m^3 in 1978. Once again Granite City topped the list with an annual average of 215 ug/m^3. This is the highest annual average since 1969 and the first year since 1976 that a site recorded an annual average above 200 ug/m^3. Of the highest nine sites in the state during the year, seven were located in Granite City. The lowest annual mean was 44 ug/m^3 recorded in Lake Bluff. Granite City also had the two highest 24-hour averages for the year.

Sulfur dioxide also showed increases reversing the long-term downward trend, with the annual statewide average standing at .012 ppm as compared to .010 in 1978. The increase was most noticeable in the Chicago/Cook County area from January through March, a period of severe winter weather which may have been a contributing factor.

Even with this increase the state remained well below the primary annual standard of .030 ppm. The highest annual average was .022 ppm, registered at GSA Building in Chicago and the State Office Building in East St. Louis. The lowest annual average was .006 ppm measured in LaSalle.

The longest continuous excursion ever recorded in Illinois occurred in Wood River and covered an 80-hour period with the highest 24-hour average of .248 ppm. Two other sites recorded violations of the 24-hour primary standard of .14 ppm. These were Springfield with .216 ppm and East St. Louis with .162 ppm.

Nitrogen dioxide levels continued a three-year trend of increasing levels. In 1979 there were 19 sites above the annual primary standard of .050 ppm. This compares to none in 1977 and 11 in 1978 with a high of .060 ppm. In 1979 the highest average was .078 ppm, recorded in Cicero while the lowest was .014, recorded in Edwardsville.

Non-methane hydrocarbons were monitored at two sites in 1979. The standard for this pollutant is a 6-9 a.m. average of .24 ppm not to be exceeded more than once per year. Both sites had 98 percent of the 6-9 a.m. averages higher than the standard.

Pollutants Suspected In Striped Bass Decline

Traces of arsenic, PCBs, and other chemicals are the latest clues in a biological detective story—the mysterious decline of Atlantic Coast striped bass. U.S. Fish and Wildlife Service biologists found the chemical residues in striped bass fry and fingerlings collected last summer from three East Coast rivers. Tests showed that the fish had weakened backbones, a condition the scientists believe is caused by toxic chemicals.

"A weakened backbone would certainly reduce the ability of striped bass to compete for food, avoid predators, or endure the stresses of migration and reproduction," according to Paul Mehrle, an FWS biochemist. "But we have a lot more work to do before we can say to what extent contaminants may be contributing to the decrease in the striped bass population."

The number of striped bass, a valuable sport and commercial fish, began dropping in the early 1970s and by 1978 had reached a 21-year low. Two federal fishery agencies—FWS and the National Marine Fisheries Service—are conducting an emergency three-year program to determine the size and distribution of striped bass populations and to find out whether the decline is natural or due to some man-made phenomenon, such as pollution or over-fishing.

Contaminants are a prime suspect in the mystery because striped bass spawn in heavily polluted rivers where the delicate young fish stay for up to three or four months after hatching. Then the young must survive for two years or more in estuaries, where they are often exposed to more pollution. Later, some stocks of striped bass migrate out to sea where they spend most of their adult lives in coastal waters.

FWS scientists have found that young striped bass from the Hudson River contained relatively high levels of PCBs (polychlorinated biphenyls, an industrial chemical), lead, and cadmium. Fish from the Potomac River contained lead, zinc, arsenic, and selenium; and fish from the Nanticoke River (Maryland) contained significant levels of arsenic and selenium. In contrast, striped bass raised at the Edenton National Fish Hatchery in North Carolina contained no significant chemical residues. Tests also revealed that the backbones of Hudson River fish were 42 percent weaker than the uncontaminated hatchery fish, while backbones of fish from the Potomac and Nanticoke showed about a 20 percent reduction in strength.

Mehrle says the studies show that contaminants begin affecting striped bass during very early life stages—within the first three months.

The researchers have already begun additional studies to learn more about the effects of contaminants on striped bass. Adult female bass have been collected from the Hudson River, the Elk and Choptank rivers in Maryland, and the Cooper River in South Carolina, and their fertilized eggs sent to a laboratory. There, studies will be made of hatching success, and of survival, growth and development of the young for 90 days after hatch. Chemical residues in eggs and young will be measured throughout the study period. FWS scientists will then see if the presence of chemical residues can be correlated with reproductive success or survival and growth of young.

At this time there is no consensus as to what is causing the drop in the number of striped bass. Some scientists think a combination of factors is responsible, while others believe the decrease is part of a natural cycle that will eventually reverse itself without human help. The tests being conducted should help provide the evidence needed to determine whether pollution is contributing to the decline of the popular fish. In the meantime, the jury is still out on the case of the declining striped bass.

Continued from p. 17

noon flight from Kathmandu to Varanasi. Clarks Hotel. City tour of Varanasi, "the oldest city in the world." Opportunity for shopping. **6:** Early morning boat ride on Ganges to see the Ghats, another highlight of trip. Afternoon flight to Agra. Overnight at Hotel Mughal. **7:** Visit the famous TAJ MAHAL in the morning. Afternoon at leisure. **8:** Travel to Bharatpur will be by deluxe motor coach, stops at Fatehpur Sikri, Akbar the Great's old capital, and a visit to the tomb of Saint Salim Chisti or the Bulland Durwaza. Overnight at the Forest Lodge. **9:** Morning viewing of nesting water birds via boat. Afternoon departure by motor coach for Jaipur. Afternoon tour of Jaipur City. Also visit Jai Singh's Astrological Observatory. Overnight at Rambagh Hotel. **10:** Morning excursion to Amber Fort. Afternoon departure by motor coach for Delhi. Overnight at Maurya Sheraton Hotel. **11:** Early morning departure for London. Overnight at the now familiar Hotel Sheraton Heathrow. **12:** Depart London in early afternoon for New York/Chicago.

The price of this unusual tour is $3,200, based on double occupancy, plus a $300 tax-deductible contribution to Field Museum. Single supplement is $347 additional. Tour leader will be Mr. Jerie S. Serrao, of the Bombay Natural History Society.

Egypt (with Nile cruise)
Co-sponsored by Field Museum and The University Museum, University of Pennsylvania

February 4-21, 1981

ITINERARY:

Feb. 4: Departure Chicago O'Hare Airport. New York is gateway city. **5:** Afternoon arrival in Cairo. Hotel Mena House Oberoi. **6:** Morning tour of the Giza Pyramids; afternoon tour of the Egyptian Museum of Antiquities. **7:** Full day excursion to Memphis and Saqqara. Attend Sound and Light performance in the evening. **8:** Depart Cairo by deluxe motor coach to Abusir. Continue to Minia; board *MS Rev Vacances* for Nile cruise. **9:** Beni Hassan/Mallawi. Morning visit to rock-cut tombs. Afternoon visit to the tomb of Petosiris at Tuna el Gebel and to El Ashmunein. **10:** Tell-el Amarna. Morning visit to Akhetaton. Afternoon, cruising on the Nile. **11:** Full day at leisure cruising on the Nile. **12:** Morning visit to the beautiful New Kingdom temples at Abydos. **13:** Morning visit to the Ptolemaic temple of Dendera. Arrive at Luxor after lunch. Afternoon visit to the temple of Amenhotep III. **14:** Full day visit to the Valley of the Kings (Luxor). In the evening, Sound and Light performance at the temples of Karnak. **15:** Morning visit to the tombs of the Nobles and the workmen's village. Afternoon visit to the temples at Karnak. **16:** Morning visit to the temple of the god Khnum at Esna. In the afternoon, visit the temple of Horus at Edfu. **17:** Sail to Kom Ombo, visit the temple dedicated to the falcon god Horus. Afternoon arrival in Aswan. Excursion by felucca to Elephantine Island. Visit Kitchener's Gardens. **18:** Disembark at Aswan. Visit the High Dam, Granite Quarries, unfinished Obelisk and the temple of Philae. Afternoon visit to rock-cut tombs of the Nobles. Overnight at Hotel Oberoi. **19:** Early morning flight to Abu Simbel. Afternoon flight from Abu Simbel to Cairo. Return to the Hotel Mena House Oberoi. **20:** After breakfast, transfer to Egyptian Museum of Antiquities for a second visit. Afternoon tour of Old Cairo. Farewell dinner at the Meridian Hotel. **21:** Morning departure from Cairo for New York/Chicago.

The lecturers for this tour are Del Nord, Ph.D. candidate in Egyptology, Department of Near Eastern Languages and Civilizations, The Oriental Institute, The University of Chicago and David P. Silverman, Ph.D., assistant professor of Egyptology at the University of Pennsylvania and assistant curator of the Egyptian Section at the University Museum.

The cost of the tour from Chicago is $3,495.00, plus a $500.00 tax-deductible contribution to Field Museum. Participation is limited to 30 people.

People's Republic of China

April 5-24, 1981

A SPECIALLY TAILORED 3-week travel/study tour of China is offered under the leadership of Mr. Phillip H. Woodruff, Ph.D. candidate in Chinese history at the University of Chicago. This is Mr. Woodruff's second time as a Field Museum China tour leader and his third visit to that country in 11 months. Cost of the tour is $4,021, plus a $300 tax-deductible contribution to Field Museum.

ITINERARY:

April 5: Depart O'Hare Airport by overnight flight (day is lost as we cross International Date Line). **6:** Arrive in Tokyo and transfer to the New Otani Hotel. **7:** Flight from Tokyo to Peking. **8-10:** In Peking. **11:** Travel from Peking to Sian. **12, 13:** In Sian. **14:** Travel from Sian to Suzhow. **15:** Travel from Suzhow to Shanghai. **16:** In Shanghai. **17:** Travel from Shanghai to Hangchow. **18:** In Hangchow. **19:** Travel from Hangchow to Kweilin. **20, 21:** In Kweilin. **22:** Travel from Kweilin to Hong Kong. Register at Mandarin Hotel. **23:** In Hong Kong, farewell cocktail party and dinner. **24:** Depart Hong Kong by homebound flight. Arrive on same date in Chicago (having gained day while crossing I.D.L.).

October & November at Field Museum

(October 15 through November 15)

New Exhibit

"THE GREAT BRONZE AGE OF CHINA: An Exhibition from the People's Republic of China." Bronze vessels, jade sculptures, and magnificent terracotta soldiers and horses attest to the range of inventive genius of the ancient Chinese. Highlights include a gilded lamp in the form of a lovely young girl; a large bronze bowl with an inscription that gives an eyewitness account of the overthrow of the Shang Dynasty by the invading Zhou; and a deadly axe blade found in a tomb with three human sacrifices. Exhibit curator: Bennet Bronson; designer: Clifford Abrams. Through October 29. Halls 26 and 27, 2nd floor.

Continuing Exhibit

"PLACE FOR WONDER." Everything in this gallery is meant to be touched, handled, and examined. Feel volcanic ash from Mount St. Helens; discover the minerals which give us soap and toothpaste; or write your name with a piece of graphite, which is used for making pencils. Open weekdays 1 p.m.-3 p.m.; weekends 10 a.m.-noon, and 1 p.m.-3 p.m. Ground floor, near cafeteria.

New Programs

"HUMAN UNIQUENESS AND ANIMAL NATURE," with Stephen Jay Gould, professor, Museum of Comparative Zoology, Harvard University. Come hear one of the world's most versatile scientists give the keynote address of the Fall Learning Museum course, "Animals in Human Perspective." Dr. Gould challenges the accepted barriers between humankind and the rest of the animal kingdom, and explores why the Western world has yet to make its peace with Darwin and the implications of evolutionary theory. Made possible by a grant from the National Endowment for the Humanities, a federal agency. Friday, Oct. 17, 8 p.m., Simpson Theatre. Call 322-8855 during business hours to order tickets now, or purchase them at the lecture door. Members $3, nonmembers $5.

RAY A. KROC ENVIRONMENTAL FILM LECTURE: "The Philippine (Monkey-Eating) Eagle Expedition," with Alan Degen. This film depicts the drama of adult eagles raising their young in one of the most endangered environments on earth, where the ravages of forest destruction are pushing the second largest of eagles to the brink of extinction. Degen, one of the film's principal photographers, narrates this intense documentary. Friday, Nov. 14, 8 p.m., Simpson Theatre. For ticket information, call 322-8854 during business hours.

YUEH LUNG SHADOW THEATRE. Don't miss this rare opportunity to see the 2,000-year-old art of Chinese Shadow Theatre animated by colorful, translucent rod puppets. Behind a back-lit screen, the puppets will pantomime two classical Chinese folk tales, "The Two Friends" and "The Crane and the Tortoise." A play about the famous Monkey King, "The Mountain of the Fiery Tongues," will also be performed. Saturday, Oct. 18 at 11 a.m. and 12:30 p.m. Tickets should be ordered in advance due to limited seating capacity; call 322-8854 during business hours. Members $3, nonmembers $5.

Yueh Lung Shadow Theatre performs on Saturday, October 18.

FREE FILMS ON ANCIENT CHINA continue every Friday, Saturday, and Sunday for the duration of "The Great Bronze Age of China" exhibit. At 11 a.m.: *China: The Beginnings* discusses the search for the origin of Chinese civilization. At 12:30 p.m.: *China: Hundred Schools to One* documents the warring between the states and the formation of the Qin empire. At 2 p.m.: *Xian* traces the history of China's ancient imperial city. Made possible by a grant from the National Endowment for the Humanities, a federal agency.

Stephen Jay Gould, noted Harvard University professor and essayist, will lecture in James Simpson Theatre on Friday, October 17, at 8:00 p.m.

EDWARD E. AYER FILM LECTURE SERIES. Explore the world without leaving Chicago, every Saturday in October and November, 2:30 p.m., in Simpson Theatre. Colorful 90-minute films, narrated by the filmmakers themselves, focus on such diverse lands as Switzerland, Sweden, and Greece. Admission is free at the West Door; Members receive priority seating. See pp. 22-23 for program details.

FALL JOURNEY: "Fossils in the Floor." Learn about fossils in this self-guided tour. Free *Journey* pamphlets are available at Museum entrances.

WEEKEND DISCOVERY PROGRAMS. Participate in a variety of free tours, demonstrations, and films on natural history every Saturday and Sunday between 11 a.m. and 3 p.m. Check the Weekend Sheet available at Museum entrances for locations and additional programs.

- ☐ Saturday, Oct. 18: "Ancient Egypt," tour, 11:30 a.m.
- ☐ Sunday, Oct. 19: "Rocks of All Ages" Film Feature: *Fossil Story*, 1 p.m.
- ☐ Saturday, Oct. 25: "Many Mexicos," tour, 1 p.m.
- ☐ Sunday, Oct. 26: "Indian Life on the Prairies," tour, 1 p.m.
- ☐ Saturday, Nov. 1: "Ancient Egypt," tour, 11:30 a.m.
- ☐ Sunday, Nov. 2: "Ethnographic Reality, Cultural Studies on Film" Film Feature: *The Barefoot Doctors of Rural China*, 1 p.m.
- ☐ Saturday, Nov. 8: "Welcome to the Field," tour, 1 p.m.
- ☐ Sunday, Nov. 9: "Ethnographic Reality, Cultural Studies on Film" Film Feature *A Man Called Bee*, 1 p.m.
- ☐ Saturday, Nov. 15: "Welcome to the Field," tour, 1 p.m.

Continuing Programs

VOLUNTEER OPPORTUNITIES. Individuals interested in working with school groups, presenting tours, and participating in other educational programs are asked to contact the volunteer coordinator at 922-9410, ext. 360.

OCTOBER AND NOVEMBER HOURS. The Museum opens daily at 9 a.m. and closes at 5 p.m. (4 p.m. beginning November 1) every day except Friday. On Fridays the Museum remains open until 9 p.m. throughout the year.

THE MUSEUM LIBRARY is open weekdays from 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor.

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Field Museum of Na l History Bulletin

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November 1980
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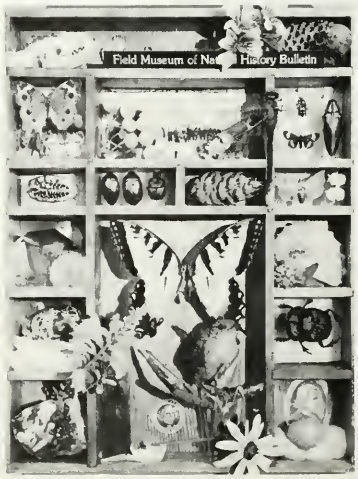
COVER

"Animal, vegetable, and mineral" might be described as the theme of this whatnot box. The editor wishes to thank Mike Gotto, Stanley Konopka, and George Petrik, all of Building Operations, for preparation of the box frame; Dave Willard, custodian of the bird collection, for the loan of robin and plover eggs; Eric Smith, custodian of the insect collection, for the loan of insects; Betty Deis, instructor, Department of Education, for the loan of miscellaneous specimens; and Emily Brandle, of the Museum Gift Shop, for the loan of mineral specimens. The Lepidoptera are from the editor's private collection. Photo by Ron Testa.



North American Indian Heritage Day

Sunday, November 23
11:00 a.m.—4:00 p.m.

A Day-Long Celebration of North American Indian culture will be hosted by Field Museum on November 23. Traditional folklore, ritual, and crafts practiced by Native Americans will be areas of special focus. Under the joint auspices of the Museum and the American Indian Center, of Chicago, the American Indian Dance Group will perform dances of the Oneida, Sioux, Seneca, Omaha, and Winnebago tribes, among others. Commentary on dance symbolism and the significance of costume design will supplement the performances.

Throughout the day, local Indian artisans will demonstrate silversmithing, weaving, flutemaking, beadworking, quillworking, and other crafts.

Also scheduled are a selection of tours of Field Museum's extensive Indian collections: a look at Hopi life in the Southwest, and symbolism and craft of American Indian dress, prehistoric life in the Illinois Valley, and the daily life of major northern tribes.

The Pawnee earth lodge in Hall 5, a life-size replica of a 19th-century Pawnee dwelling, is open all day, and guides are on hand to answer questions about Pawnee life. Supplemental slide presentations provide information on the history and culture of the Pawnee.

There will also be an opportunity during North American Indian Heritage Day to view selections from Field Museum's film archives. Films include the story of Ishi, the last aboriginal Indian of North America discovered in California in 1911; Maria Martinez, the world-renowned Pueblo potter from New Mexico who died earlier this year; and scenes from Edward S. Curtis's legendary 1913 film, "In the Land of War Canoes," which is concerned with rituals of the Northwest Coast Kwakiutl Indians.

November 23 promises to be a fascinating day for the entire family. See dances performed as they once were executed in years past, talk to Indian artisans who reminisce about their tribal ways and crafts, and experience the rich heritage of the first Americans.

All activities are free with Museum admission. Complete listing of events available on Sunday, November 23, at Museum entrances. Tickets are not necessary. For more information, see the November Calendar of Events or call 312-322-8854.

Lowly Asphalt Comes into Its Own

The Significance of Asphalt in the technology of early civilizations is coming to light

by ROBERT F. MARSCHNER

Archeologists sometimes encounter in their excavations a viscous mixture of liquid bitumen with solid mineral matter—the substance commonly called asphalt. In the early days of archeological investigation it was usually overlooked or ignored, and its importance to early man as an adhesive, sealant, and protectant was hardly recognized. Only in recent years has asphalt gained enough attention as an archeological material to be the subject of independent study and analysis.

An exception to this generalization is a collaboration between a university archeologist and a petroleum-industry chemist that occurred nearly fifty years ago. The archeologist was Henri Frankfort, visiting professor at the Oriental Institute of the University of Chicago, who had unearthed several large structures at Tell Asmar, in what is today central Iraq. The chemist was R. J. Forbes, of the Royal Dutch Shell Laboratories in Amsterdam; he was interested in the early history of petroleum. Nine samples of asphalt mortars and floorings excavated by Frankfort were analyzed by Forbes in the early 1930s. Until now, what little was known about the composition of asphalts used by the ancients was based almost entirely on these nine samples. In the past decade, however, collaboration like that of Frankfort and Forbes has multiplied.

Asphalt as found in archeological sites is rather nondescript. Its color tends toward chocolate brown, the shade depending upon the local

Rancho La Brea Tar Pit, near Los Angeles. Workmen are excavating pelvises of giant ground sloths. Note liquid asphalt seeping from excavation wall 1915 photo; courtesy George C. Page Museum, La Brea Discoveries (a branch of the Los Angeles County Museum of Natural History).

Dave Walsten

The author, right, with Donald Whitcomb, assistant curator of Middle Eastern archeology and ethnology, as they examine ancient artifacts made of or used for bitumen. The larger piece (Cat. no. 156986), a cup constructed largely of an ostrich shell, has a base and top portion made of bitumen with mother-of-pearl inlay; from Egypt, early third dynasty. The small jar (#157450), from Kish, Iraq, contained a great deal of bitumen. The dark streaks are not design but bitumen spilled on the jar surface.

dirt or dust blown or washed in. Its shape varies with its function in man's technology: mortars sometimes carry impressions of inscriptions on bricks, and sealants may transfer patterns of woven baskets or mats. Especially common are small flattened discs containing parallel streaks of mineral, the purpose of these discs, however, is still a mystery.

Separating the components of asphalt is deceptively simple: an organic solvent such as chloroform or toluene is used to dissolve the bitumen, which can then be recovered by distilling off the solvent, leaving the mineral matter unaffected. But there are two difficulties: several time-consuming extractions are sometimes needed to completely remove the bitumen; and some mineral fines (fine-grained fractions) either pass through coarse filter paper or clog the pores of fine filter paper. The result is that usually some bitumen remains in the mineral and some mineral remains in the bitumen. But the use of adequate solvent, as well as decantation and centrifuging, together with patience, experience, and arithmetic corrections, usually can result in an acceptable analysis.

After the bitumen has been mostly removed, the mineral can be examined. A drop of acid on a pinch of it will ordinarily identify it as either sand (silica), which is unaffected by the acid, or as limestone (carbonate), which froths visibly in reaction to the acid. Usually, both sand and limestone are present; their relative proportions can be demonstrated by weighing a sample before and after ignition in a bunsen burner.

Asphalt was also used by aborigines of several other parts of the New World. The Ol-

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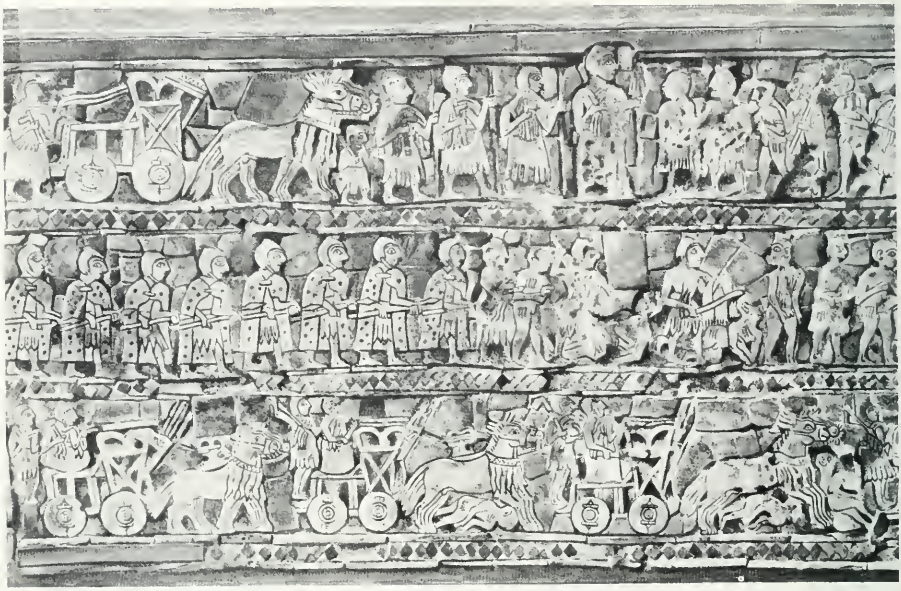
Robert F. Marschner is a research associate in the Department of Geology.



The Standard of Ur (detail, 40% nat. size), in the British Museum, was made partly of bitumen.

mecs of Yucatan lined ducts and sewers of the so-called "Acropolis" at La Venta with asphalt. Old asphalt diggings were found by the first Spaniards in Peru at Punta Parinas, the westernmost point of South America. A dozen other instances of use in the Americas have been identified, but there has been no confirmation of the legend that the Incas paved their roads with asphalt. Those rocky mountain trails would have benefitted little from such treatment.

Native asphalts could occasionally be employed for some purposes in its natural, unaltered form. But in cold regions the natural mix would be too thin for most purposes and in warm regions it might be too thick. Eventually, man discovered how to adjust the asphalt composition to the particular purpose he had in mind: adding dust when the mix was too soft; adding raw seepage when the mix was too hard. Still later he learned that heating the mix facilitated incorporation. Several samples found in Middle East sites were twice too rich in bitumen for general use, suggesting that storage of asphalt of intermediate consistency was common practice.

An early use of asphalt was as a cement or glue, and perhaps the earliest use of all was for hafting: the joining of wooden handles to stone points for use as weapons or tools. Tiny blades arranged like a row of teeth in a crude sickle show traces of the asphalt with which they were presumably sealed into the wood or bone handles. Points larger than such microliths often still carry bits of asphalt that once affixed them to shafts to form spears. Similar uses were the attachment of fishhooks to leaders and sinkers; handles to knives, scrapers and paddles; and cloth and matting to stone, wood, or other woven articles. Asphalt was also used for mending broken objects such as grinding stones, pottery vases, and toys.

Since it is impervious to water, asphalt was frequently used as a coating or sealant. Reed coracles that have plied the Euphrates River for centuries, and wooden canoes in which the Chumash Indians island-hopped along the California coast were coated thickly outside with asphalt to keep water out. At Nineveh in Iraq and at Talara in Peru earthenware jars coated inside with asphalt protected the food and drink contents by keeping water out. Use of asphalt as a water barrier extended from the baths at Pakistan's Mohenjo Daro to a canteen found in Santa Barbara.

The most extensive use of asphalt was as a structural material for articles of every size. In addition to coating bricks, it was also used to cover roofs, stairways, and drains, and as paving for streets and roadways, much as it is today. A myriad of smaller articles were made from bulk asphalt: beads, models, toys, dice, plugs, as well as objects of unknown purpose made from flattened or rolled-out spheres of asphalt.

X-ray diffraction has also been used recently to determine the sand and limestone content, though this technique is still being refined. One problem may be unresolvable: distinguishing native mineral matter originally present, mineral fines added by man to adjust the consistency of the asphalt, and mineral contamination introduced by chance over the interim of a few thousand years.

Once it is free of solids, the bitumen can be examined for its specific gravity, softening point, and sulfur content. Recently, the technique of gas

chromatography has been used in "fingerprinting" bitumens from archeological sources in much the same way that it has been used to identify petroleums in oil spills.

In our collaborative study[1] of the early use of asphalt in the ancient Middle East, Henry T. Wright, of the Museum of Anthropology of the University of Michigan, and I examined in the laboratories of the Standard Oil Company (Indiana) 60 samples from a dozen sites ranging in age from 3,000 to 5,000 years.

The older samples came from upland sites among streams in the Zagros Mountains of Iran and Iraq. Farukhabad, a town near an asphalt seepage known as Ain Gir, may have been a center for the preparation of asphalt for shipment; asphalts excavated there at levels as chronologically far apart as 4500 B.C. and 3000 B.C. hardly differed from one another. In such large cities of ancient Mesopotamia as Nineveh, Babylon, and Ur of the Chaldees, asphalt was used literally by the ton. Most of it went into mortar for large brick structures.

Greater Mesopotamia was almost the only region in the East where bitumen had long been used. At Mohenjo Daro, a site on the Indus River in Pakistan, a one-inch layer of bitumen served as backing for the exposed tiles of an elaborate bathing pool. The source of the bitumen found there is uncertain; that it was imported from as far away as Mesopotamia seems unlikely. Bitumen was used little if at all in ancient Egypt, although potential sources of the substance existed in the Dead Sea and along the Great Rift in the Gulf of Suez.

In their study[2] of the later use of asphalt in the West, Theodore E. Gutman, of the Institute of Archaeology of the University of California at Los Angeles, and L. W. Slentz, of the Chevron Oil Field Research Laboratory, La Habra, California, collaborated on a study of asphalts used by the Chumash Indians. These people once inhabited the Santa Barbara coast and offshore islands west of Los Angeles. Gutman and Slentz worked with eight archeological samples ranging in age from 200 to 2,000 years, and with several local seepages, including that of the nearby Rancho La Brea Tar Pits. Uses to which the older samples had been put were uncertain, but one of the more recent samples had clearly been used as an adhesive. Although analyses varied considerably, bitumens from some of the samples resembled those from local seepages.

Another widespread use of asphalt was as a matrix and adhesive for decorative bits of bright material such as shell, bone, and colored stone.

Continued on p. 9

1. Robert F. Marschner, Henry T. Wright, "Asphalts from Middle Eastern Sites," Advances in Chemistry Series, No. 171 (1978).

2. Theodore E. Gutman, "Use of Asphaltum Sourcing in Archaeology," Journal of New World Archaeology, 3 (2), (1979).

Dave Walsten

Author Robert F. Marschner uses gas chromatograph in the Department of Geology's geochemical laboratory to analyze bitumen samples and other volatile substances.

*Dove-Catching with Salt And Other Adventures**

by WILLIAM HENRY HUDSON

One spring day an immense number of doves appeared and settled in the plantation. It was a species common in the country and bred in our trees, and in fact in every grove or orchard in the land—a pretty dove-coloured bird with a pretty sorrowful song, about a third less in size than the domestic pigeon, and belongs to the American genus *Zenaida*. This dove was a resident with us all the year round, but occasionally in spring and autumn they were to be seen travelling in immense flocks, and these were evidently strangers in the land and came from some sub-tropical country in the north where they had no fear of the human form. At all events, on going out into the plantation I found them all about on the ground, diligently searching for seeds, and so tame and heedless of my presence that I actually attempted to capture them with my hands. But they wouldn't be caught: the bird when I stooped and put out my hands slipped away, and flying a yard or two would settle down in front of me and go on looking for and picking up invisible seeds.

My attempts failing I rushed back to the house, wildly excited, to look for an old gentleman who lived with us and took an interest in me and my passion for birds, and finding him I told him the whole place was swarming with doves and they were perfectly tame but wouldn't let me catch them—could he tell me how to catch them? He laughed and said I must be a little fool not to know how to catch a bird. The only way was to put salt on their tails. There would be no difficulty in doing that, I thought, and how delighted I was to know that birds could be caught so easily! Off I ran to the salt-barrel and filled my pockets and hands with coarse salt used to make brine in which to dip the hides; for I wanted to catch a great many doves—armfuls of doves.

In a few minutes I was out again in the plantation, with doves in hundreds moving over the ground all about me and taking no notice of me. It was a joyful and exciting moment when I started operations, but I soon found that when I tossed a handful of salt at the bird's tail it never fell on its tail—it fell on the ground two or three or four inches short of the tail. If, I thought, the bird would only keep still a moment longer! But then it wouldn't, and I think I spent quite two hours in these vain attempts to make the salt fall on the right place. At last I went back to my mentor to confess that I had failed and to ask for fresh instructions, but all he would say was that I was on the right track, that the plan I had adopted was the proper one, and all that was wanted was a little practice to enable me to drop the salt on the right spot. Thus encouraged I filled my pockets again and started afresh, and then finding that by following the proper plan I made no progress I adopted a new one, which was to take a handful of salt and hurl it at the bird's tail. Still I couldn't touch the tail; my violent action only frightened the bird and caused it to fly away, a dozen yards or so, before dropping down again to resume its seedsearching business.

By-and-by I was told by somebody that birds could not be caught by putting salt on their tails; that I was being made a fool of, and this was a great shock to me, since I had been taught to believe that it was wicked to tell a lie. Now for the first time I discovered that there were lies and lies, or untruths that were not lies, which one could tell innocently although they were invented and deliberately told to deceive. This angered me at first, and I wanted to know how I was to distinguish between real lies and lies that were not lies, and the only answer I got was that I could distinguish them by not being a fool!...

These rough plains were also the haunt of the rhea, our ostrich, and it was here that I first had a close sight of this greatest and most unbird-like bird of our continent. I was eight years old then, when one afternoon in late summer I was just setting off for a ride on my pony, when I was told to go out on the east side till I came to the cardoon-covered land about a mile beyond the shepherd's ranch. The shepherd was wanted in the plantation and could not go to the flock just yet, and I was told to look for the flock and turn it towards home.

I found the flock just where I had been told to look for it, the sheep very widely scattered, and some groups of a dozen or two to a hundred were just visible at a distance among the rough bushes. Just where these furthest sheep were grazing there was a scattered troop of seventy or eighty horses grazing too, and when I rode to that spot I all at once found myself among a lot of rheas, feeding too among the sheep and horses. Their grey plumage being so much like the cardoon bushes in colour had prevented me from seeing them before I was right among them.

**From* Far Away and Long Ago: A History of My Early Life *(1918), by William Henry Hudson (1841-1922), concerned with Hudson's boyhood in Argentina. Hudson is best known for his romance,* Green Mansions.

The strange thing was that they paid not the slightest attention to me, and pulling up my pony I sat staring in astonishment at them, particularly at one, a very big one and nearest to me, engaged in leisurely pecking at the clover plants growing among the big prickly thistle leaves, and as it seemed carefully selecting the best sprays.

What a great noble-looking bird it was and how beautiful in its loose grey-and-white plumage, hanging like a picturesquely-worn mantle about its body! Why were they so tame? I wondered. The sight of a mounted gaucho, even at a great distance, will invariably set them off at their topmost speed; yet here I was within a dozen yards of one of them, with several others about me, all occupied in examining the herbage and selecting the nicest-looking leaves to pluck, just as if I was not there at all! I suppose it was because I was only a small boy on a small horse and was not associated in the ostrich brain with the wild-looking gaucho on his big animal charging upon him with a deadly purpose. Presently I went straight at the one near me, and he then raised his head and neck and moved carelessly away to a distance of a few yards, then began cropping the clover once more. I rode at him again, putting my pony to a trot, and when within two yards of him he all at once swung his body round in a quaint way towards me, and breaking into a sort of dancing trot brushed past me.

Pulling up again and looking back I found he was ten or twelve yards behind me, once more quietly engaged in cropping clover leaves!

Again and again this bird, and one of the others I rode at, practised the same pretty trick, first appearing perfectly unconcerned at my presence and then, when I made a charge at them, with just one little careless movement placing themselves a dozen yards behind me.

But this same trick of the rhea is wonderful to see when the hunted bird is spent with running and is finally overtaken by one of the hunters who has perhaps lost the bolas with which he captures his quarry, and who endeavours to place himself side by side with it so as to reach it with his knife. It seems an easy thing to do: the bird is plainly exhausted, panting, his wings hanging, as he lopes on, yet no sooner is the man within striking distance than the sudden motion comes into play, and the bird as by a miracle is now behind instead of at the side of the horse. And before the horse going at top speed can be reined in the turned round, the rhea has had time to recover his wind and get a hundred yards away or more. It is on account of this tricky instinct of the rhea that the gauchos say, "El avestruz es el mas *gaucho* de los animales," which means that the ostrich, in its resourcefulness and the tricks it practises to save itself when hard pressed, is as clever as the gaucho knows himself to be.

Continued from p 7

A famous example of an artwork using asphalt in this way is the "Standard of Ur," a mosaic of shell set in bitumen that depicts a procession of human figures. Many objects found in both the eastern and western hemispheres—figurines, ornaments, pipes, bowls, and so on—were decorated in a similar way. Bitumen was also used in medicine: externally as a salve for sprains and skin abrasions, and internally with fruit juice for unknown ailments.

Such a versatile substance as asphalt would certainly have created a demand among neighbors and visitors. Its value might have been great enough to justify transporting it over long distances, especially if it were rich in bitumen, for the mineral component of asphalt could be obtained almost anywhere. But the primitive bags, pots, and baskets used for containers were subject to leakage, breakage, and losses. Enough solid mineral to simplify handling might have been added to the bitumen at the seepage site where it was found. Thus, bitumen and asphalt became early articles of commerce in certain parts of the world.

Trade in bitumen was probably limited to intermediate distances. Among the early upland towns of the Zagros Mountains, where asphalt was first used, the bitumen contained, on the average, 5.8 percent sulfur; but that found in the later Mesopotamian cities averaged 7.4 percent sulfur. Evidently different sources of bitumen were used in the uplands than among the rivers, although better analyses of more seepages are needed to further refine this information. Most likely the bitumen came from many sources, and the growing demand for asphalt for construction in the big cities was met from newer, closer sources than from the mountain seepages. Bitumen seepages available to Western peoples in antiquity have been analyzed even less than those of the Middle East, but we believe that use in the West was more local.

Getting samples of the bitumen that was available to ancient man is most difficult. The investigator must first assume that seepages flow today as they did in antiquity, and that they have neither started nor stopped flowing because of earth movements. (A chancy assumption in either California or the Middle East.) Aboriginal discoverers of a seepage would have removed what dirt and rocks they could in order to enlarge the flow. When tools became available, pits were dug, and for the past century wells have been drilled near most of the world's known seepages. Some seepages in valleys have been covered by water behind dams; others have been covered by fill from building, land-levelling, or irrigation projects. Some seepages made into asphalts by millennia of ancient technologists will never be analyzed.

Endangered and Threatened Invertebrate Species

of North America, Central America, and the Caribbean

The listings of endangered and threatened invertebrates and plants on these two pages were extracted from a complete list, including all countries of the world, which appeared in the Federal Register *of May 20, 1980. A listing of the endangered and threatened vertebrates of North and Central America, the Caribbean, and Pacific possessions of the United States appeared in the October, 1980,* Bulletin.

Common Name	Scientific Name	Historic Range	Status
SNAILS			
Snail, Chittenango ovate amber	*Succinea chittenangoensis*	NY	T
Snail, flat-spired three-toothed	*Triodopsis platysayoides*	WV	T
Snail, Iowa Pleistocene	*Discus macclintocki*	IA	E
Snail, noonday	*Mesodon clarki nantahala*	NC	T
Snail, painted snake coiled forest	*Anguispira picta*	TN	T
Snail, Stock Island	*Orthalicus reses*	FL	T
Snail, Virginia fringed mountain	*Polygyriscus virginianus*	VA	E
CLAMS			
Pearly mussel, Alabama lamp	*Lampsilis virescens*	AL, TN	E
Pearly mussel, Appalachian monkeyface	*Quadrula sparsa*	TN, VA	E
Pearly mussel, birdwing	*Conradilla caelata*	TN, VA	E
Pearly mussel, Cumberland bean	*Villosa trabalis*	KY	E
Pearly mussel, Cumberland monkeyface	*Quadrula intermedia*	AL, TN, VA	E
Pearly mussel, Curtis'	*Epioblasma florentina curtisi*	MO	E
Pearly mussel, dromedary	*Dromus dromus*	TN, VA	E
Pearly mussel, green-blossom	*Epioblasma torulosa gubenaculum*	TN, VA	E
Pearly mussel, Higgin's eye	*Lampsilis higginsi*	IL, IA, MN, MO, NE, WI	E
Pearly mussel, Nicklin's	*Megalonaias nicklineana*	Mexico	E
Pearly mussel, orange-footed	*Plethobasis cooperianus*	AL, IN, IA, KY, OH, PA, TN	E
Pearly mussel, pale lilliput	*Toxolasma cylindrella*	AL, MO, TN, WV	E
Pearly mussel, pink mucket	*Lampsilis orbiculata*	AL, IL, IN, KY, MO, OH, PA, TN, WV	E
Pearly mussel, Sampson's	*Epioblasma sampsoni*	IL, IN	E
Pearly mussel, Tampico	*Cyrtonaias tampicoensis*	Mexico	E
Pearly mussel, tubercled-blossom	*Epioblasma torulosa torulosa*	IL, KY, TN, WV	E
Pearly mussel, turgid-blossom	*Epioblasma turgidula*	AL, AR, MO, TN	E
Pearly mussel, white cat's eye	*Epioblasma sulcata delicata*	IN, MI, OH	E
Pearly mussel, white wartyback	*Plethobasis circatricosus*	AL, TN	E
Pearly mussel, yellow-blossom	*Epioblasma florentina florentina*	AL, TN	E
Pigtoe, fine-rayed	*Fusconaia cuneolus*	AL, TN, VA	E
Pigtoe, rough	*Pleurobema plenum*	KY, TN, VA	E
Pigtoe, shiny	*Fusconaia edgariana*	AL, TN, VA	E
Pocketbook, fat	*Potamilus capax*	AR, IN, MO, OH	E
Riffle shell clam, tan	*Epioblasma walkeri*	KY, TN, VA	E
CRUSTACEANS			
Isopod, Socorro	*Exosphaeroma thermophilus*	NM	E
INSECTS			
Butterfly, Bahama swallowtail	*Papilio andraemon bonhotei*	FL, Bahamas	T
Butterfly, El Segundo blue	*Euphilotes battoides allyni*	CA	E
Butterfly, Lange's metalmark	*Apodemia mormo langei*	CA	E
Butterfly, Lotis blue	*Lycaeides argyrognomon lotis*	CA	E
Butterfly, mission blue	*Icaricia icarioides missionensis*	CA	E
Butterfly, San Bruno elfin	*Callophrys mossii bayensis*	CA	E
Butterfly, Schaus swallowtail	*Papilio aristodemus ponceanus*	FL	T
Butterfly, Smith's blue	*Euphilotes enoptes smithi*	FL	E
Moth, Kern primrose sphinx	*Euproserpinus euterpe*	CA	T

Endangered and Threatened Plants

(Note that all but two species occur in the United States)

Scientific name	Common name	Historic range	Status
Sagittaria fasciculata	Bunched arrowhead	NC, SC	E
Echinacea tennesseensis	Tennessee purple coneflower	TN	E
Lipochaeta venosa	None	HI	E
Berberis sonnei	Truckee barberry	CA	E
Betula uber	Virginia round-leaf birch	VA	E
Arabis mcdonaldiana	McDonald's rock-cress	CA	E
Erysimum vapitatum var. *angustatum*	Contra Costa wallflower	CA	E
*Ancistrocactus tobuschii**	Tobusch fishhook cactus	TX	E
Coryphantha minima	Nellie cory cactus	TX	E
Coryphantha ramillosa	Bunched cory cactus	TX	T
Coryphantha sneedii var. *leei*	Lee pincushion cactus	NM	T
Coryphantha sneedii var. *sneedii*	Sneed pincushion cactus	TX, NM	E
Echinocactus horizonthalonius var. *nicholii*	Nichol's Turk's head cactus	AZ	E
Echinocereus engelmannii var. *purpureus*	Purple-spined hedgehog cactus	UT	E
Echinocereus kuenzleri	Kuenzler hedgehog cactus	NM	E
Echinocereus lloydii	Lloyd's hedgehog cactus	TX	T
Echinocereus reichenbachii var. *albertii*	Black lace cactus	TX	E
Echinocereus triglochidiatus var. *arizonicus*	Arizona hedgehog cactus	AZ	E
Echinocereus triglochidiatus var. *inermis*	Spineless hedgehog cactus	CO, UT	E
Echinocereus viridiflorus var. *davisii*	Davis' green pitaya	TX	E
Neolloydia mariposensis	Lloyd's Mariposa cactus	TX	E
Pediocactus bradyi	Brady pincushion cactus	AZ	E
Pediocactus knowltonii	Knowlton cactus	NM	E
Pediocactus peeblesianus var. *peeblesianus*	Peeble's Navajo cactus	AZ	E
Pediocactus sileri	Silver pincushion cactus	AZ, UT	E
Sclerocactus glaucus	Uinta Basin hookless cactus	CO, UT	T
Sclerocactus mesae-verdae	Mesa Verde cactus	CO, MN	T
Sclerocactus wrightiae	Wright fishhook cactus	UT	E
Dudleya traskiae	Santa Barbara Island liveforever	CA	E
Fitzroya cupressoides	Chilean false larch	Chile, Argentina	T
Arctostaphylos hookeri ssp. *ravenii*	Raven's manzanita	CA	E
Rhododendron chapmanii	Chapman rhododendron	FL	E
Astragalus perianus	Rydberg milk-vetch	UT	T
Baptisia arachnifera	Hairy rattleweed	GA	E
Lotus scoparius ssp. *traskiae*	San Clemente broom	CA	E
Vicia menziesii	Hawaiian wild broad-bean	HI	E
Phacelia argillacea	None	UT	E
Haplostachys haplostachya var. *angustifolia*	None	HI	E
Pogogyne abramsii	San Diego mesa mint	CA	E
Stenogyne angustifolia var. *angustifolia*	None	HI	E
Harperocallis flava	Harper's beauty	FL	E
Trillium persistens	Persistent trillium	GA, SC	E
Kokia cookei	Cooke's kokio	HI	E
Malacothamnus clementinus	San Clemente Island bush mallow	CA	E
Mirabilis macfarlanei	MacFarlane's four-o'clock	ID, OR	E
Oenothera avita ssp. *eurekensis*	Eureka evening primrose	CA	E
Oenothera deltoides ssp. *howellii*	Antioch Dunes evening primrose	CA	E
Arctomecon humilis	Dwarf bear-poppy	UT	E
Abies guatemalensis	Guatemalan fir	Mexico, Guatemala, Honduras, El Salvador	T
Orcuttia mucronata	Solano grass	CA	E
Swallenia alexandrae	Eureka dune grass	CA	E
Zizania texana	Texas wild-rice	TX	E
Aconitum noveboracense	Northern wild monkshood	IA, NY, OH, WI	T
Delphinium kinkiense	San Clemente Island Larkspur	CA	E
Sarracenia oreophila	Green pitcher plant	AL, GA	E
Castilleja grisea	San Clemente Island Indian paintbrush	CA	E
Cordylanthus maritimus ssp. *maritimus*	Salt marsh bird's beak	CA, Baja California	E
Pedicularis furbishiae	Furbish lousewort	ME, New Brunswick	E

*Many plant species in this list have alternate scientific names, not included here for lack of space

The Technology of The Northwest Coast Halibut Fisherman

by RONALD L. WEBER

On the Northwest Coast of North America lived a people distinguished among American Indians by their large plank houses, monumental wood sculpture commonly known as totem poles, and seaworthy dugout canoes. A great variety of food from the sea and rivers supported large villages, and fishing equipment was adapted to the needs of this large population.

The first Europeans to come to the coast were impressed by Northwest Coast fishing technology. In 1787 Captain George Dixon was perplexed to discover that the skill of his fishermen was inferior to that of the Indians. His supercargo, William Beresford, noted that "On one occasion the whaleboat was sent with seven hands to fish for halibut... where the natives were then fishing." The Englishmen found that "their success was greatly inferior to that of two Indians who were fishing at the same time, which is rather extraordinary, if we consider the apparent inferiority of their tackle to ours." Beresford discusses the Tlingit halibut hook and method of fishing, concluding, "Thus were we fairly beaten at our own weapons, and the natives constantly bringing us plenty of fish, our boat was never sent on this business afterwards."[1]

Knowledge of the habits of the fish, the best areas for fishing and the proper ritual treatment was important, but it was the tackle of the Indians that most fully accounted for their success. This tackle was well adapted to the specific habits of the halibut, whereas the European generalized iron hooks were relatively primitive pieces of equipment.

Two varieties of halibut hooks were used on the Northwest Coast. A U-shaped variety, most common among the Kwakiutl and Nootka, was made by steaming and bending a small branch of fir wood and then affixing a bone barb *(fig. 1)*. U-shaped hooks were not decorated. After European contact the bone barbs were replaced with metal ones and, still later, some U-hooks were made entirely of iron.

Another kind of halibut hook used by the Northern tribes, especially by the Tlingit and Haida, was a V-shaped hook consisting of an uncarved arm of yellow cedar or some other buoyant wood, and a heavier carved piece of alder or yew *(fig. 2)*. The carving magically lured the fish to allow itself to be caught. In use, the carved arm faced downward toward the halibut at the ocean's bottom and the uncarved arm, floating upward, held the barb and bait. V-shaped hooks were commonly set singly, while U-shaped hooks were often set in pairs. Occasionally, setlines of many hooks were used.

The halibut hook was attached to the line by means of a single hole in the carved arm, and held near the ocean bottom by a loosely secured stone sinker *(fig. 4a)*. The hook floated up above

Ronald L. Weber is visiting assistant curator of anthropology.

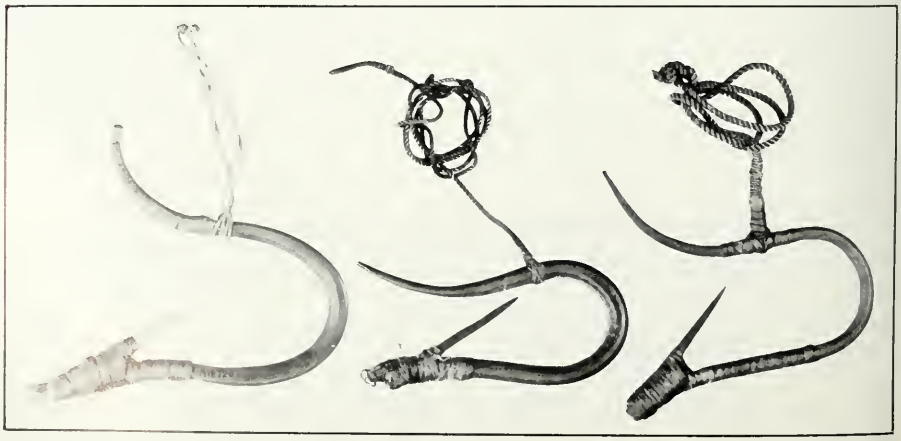


Fig. 1. *Southern U-shaped halibut hooks, l. to r.: with bone barb, (#18720); with iron barb, (#18881); iron hook with iron barb (#18872).*

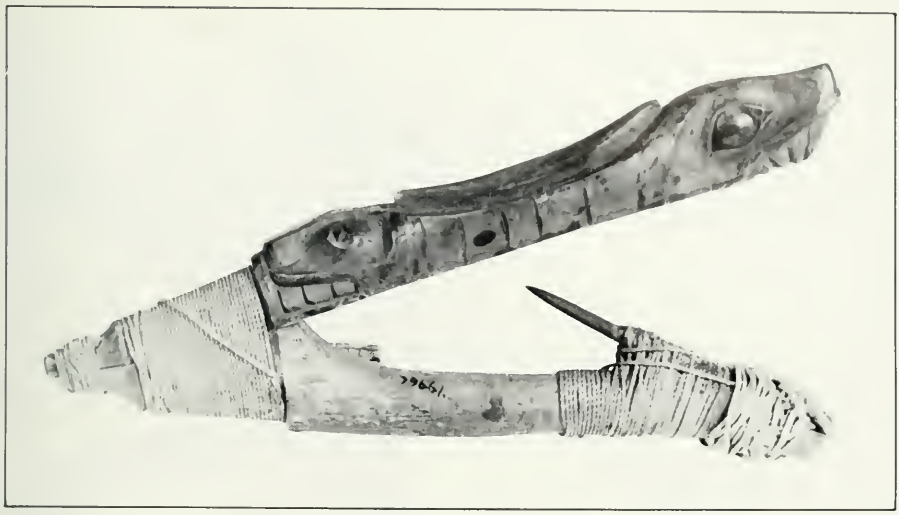


Fig. 2. *Northern V-shaped halibut hook carved to represent canoe in form of two-headed serpent. #79661.*

the bottom and rested in a horizontal position, which made the barb more accessible to the flat, horizontally swimming fish. A float attached to the upper end of the line prevented it from sinking below the surface, and sometimes a larger float was also used to mark the position of the line. The hook was most frequently baited with squid or octopus. When a fish took the bait, its movement caused the line looped around the sinker to come free, and the float on the surface to signal that a catch had been made *(fig. 4b)*. Pulling upon the line caused the lower arm of the hook, to which the line was attached, to press against the underside of the halibut and to flip the fish onto its back *(figs. 4c, 4d)*. This made it easier for the fisherman to control the catch, which might range from 40 to nearly 470 pounds.[2] Before being lifted into the canoe, the halibut was speared through the gills and clubbed *(fig. 5)*.

It was believed that a fish allowed itself to be caught. Provided that the proper ritual was observed and no offense given, the fish's spirit returned to the sea to take on another body. This ensured the fisherman's continued success. Before lowering the hook the fisherman spoke a magical phrase such as "Go down to halibut land and fight."[3] When landing a fish he might say, "Now hold this my younger brother; don't let go this, my younger brother."[4] These words were believed to reenforce magically the effectiveness of the hook. Men were not actively involved

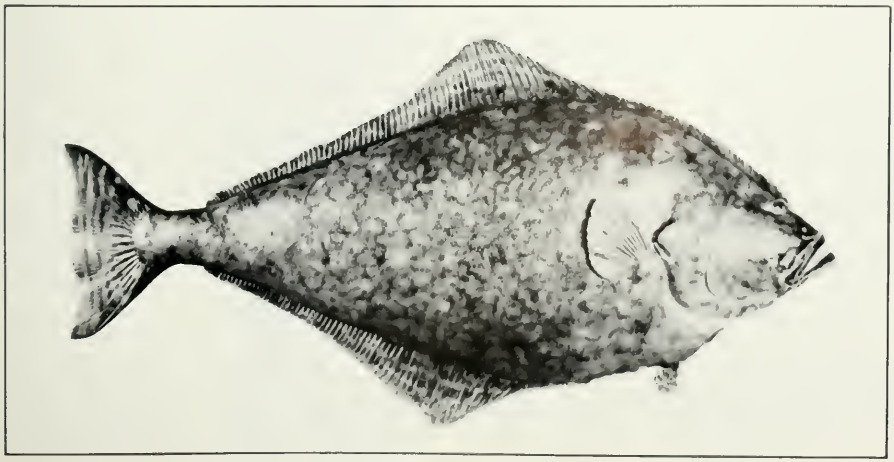


Fig. 3. *Dorsal (top) surface of Field Museum's 5-foot model of Pacific halibut.*

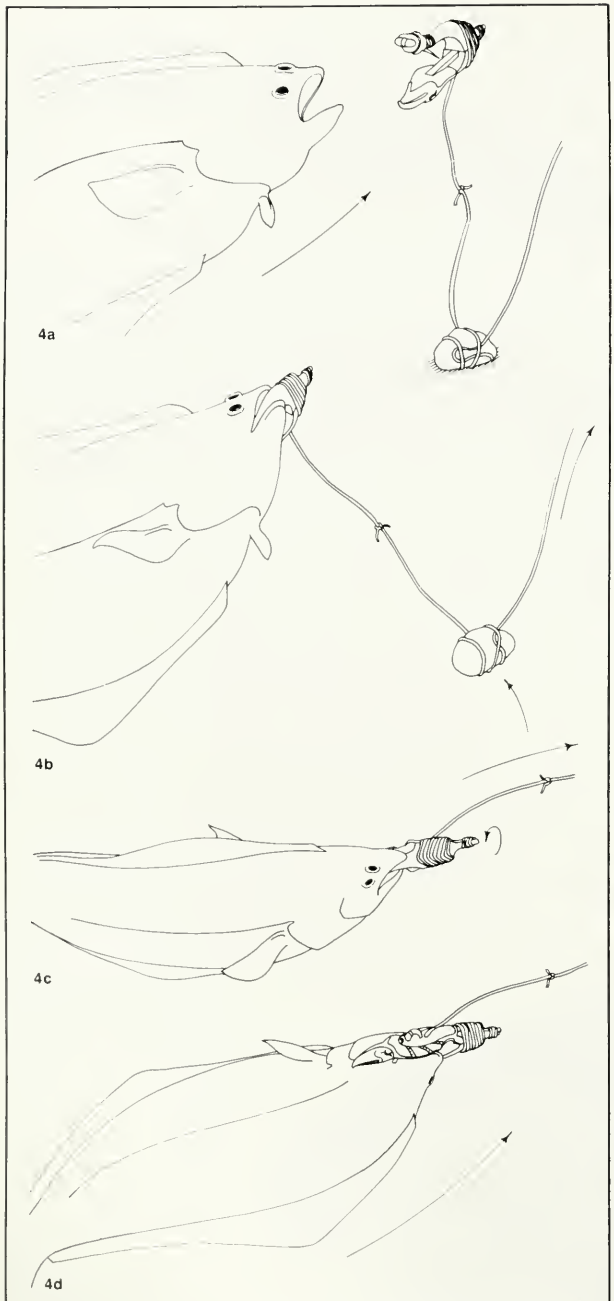


Fig. 4a: *V-shaped halibut hooks were held near the bottom with loosely secured stone sinker;* 4b: *When the fish strikes the sinker comes free,* 4c: *The fisherman has pulled the line taut;* 4d: *The carved arm of the hook presses against the underside of the halibut and flips the fish onto its back. (Drawings by David Dann.)*

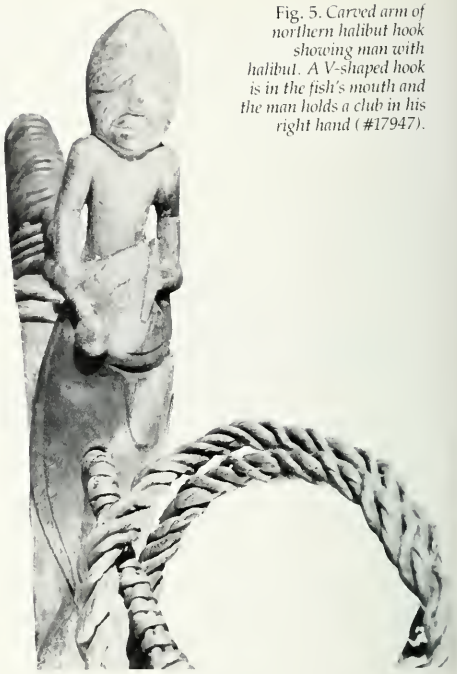


Fig. 5. *Carved arm of northern halibut hook showing man with halibut. A V-shaped hook is in the fish's mouth and the man holds a club in his right hand (#17947).*

Fig. 6. *Hook showing halibut-man with two land otters (#179860).*

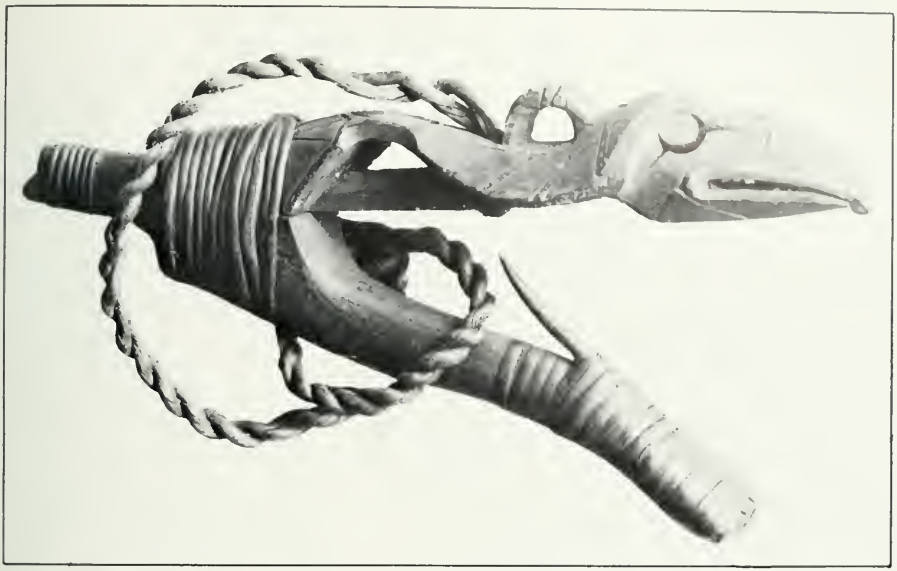


Fig. 7. *Hook showing composite animal with body of halibut and head of raven (#77898).*

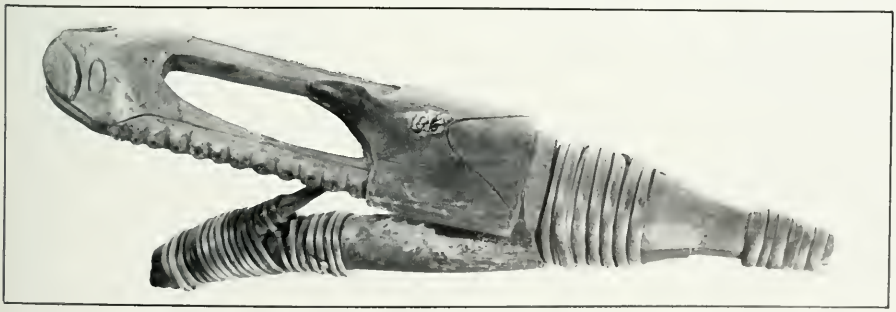


Fig. 8. *Hook showing seal and octopus (#18157).*

in the catching of the fish; rather the hook functioned supernaturally. Carvings on the hook represented various animals—octopus, land otter, and mythical composite creatures—similar to ones depicted on shaman's charms (*figs. 6, 7, 8*). These creatures were believed to provide supernatural power to the hooks.[5]

Unlike with the hooks, men actively directed the killing clubs with which fish were killed. Thus, where supernatural power was of little importance, the halibut clubs were decorated in a profane art style closely associated with the society of a village. This style was used to ornament storage boxes, chests, and house fronts as well as other items that reflected the wealth and prestige of the owners.

The success of Northwest Coast fishermen was the result of millenia of technological development, during which their culture became highly adapted to the special conditions of the coast. Different tools were made with regard to the habits of the type of fish sought. The halibut hook, with its deceivingly clumsy appearance, was actually a highly efficient device for catching a special variety of fish. □

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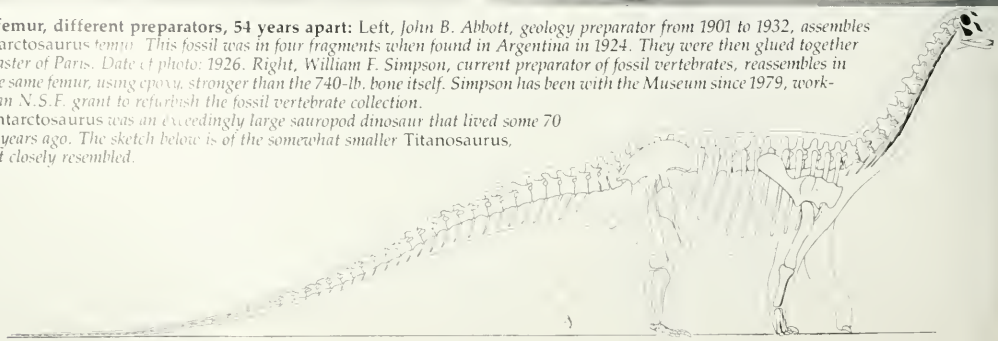
2. deLaguna, Frederica. 1972. "Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit," *Smithsonian Contributions to Anthropology*, vol. 7, Washington, D.C., pp. 126, 390-391.
3. Jonaitis, Aldona. 1978. "Land Otters and Shamans: Some Interpretations of Tlingit Charms." *American Indian Art Magazine*, Vol. 4(1), pp. 62-66.
4. _____. 1980. "The Devilfish in Tlingit Sacred Art," *American Indian Art Magazine*, vol. 6(3), pp. 42-47.
5. Stewart, Hilary. 1977. *Indian Fishing: Early Methods on the Northwest Coast*. University of Washington Press, Seattle, p. 48.

BEHIND THE SCENES

Ron Testa

Same femur, different preparators, 54 years apart: Left, *John B. Abbott, geology preparator from 1901 to 1932, assembles an* Antarctosaurus *femur. This fossil was in four fragments when found in Argentina in 1924. They were then glued together with plaster of Paris. Date of photo: 1926. Right, William F. Simpson, current preparator of fossil vertebrates, reassembles in 1980 the same femur, using epoxy, stronger than the 740-lb. bone itself. Simpson has been with the Museum since 1979, working on an N.S.F. grant to refurbish the fossil vertebrate collection.*

Antarctosaurus *was an exceedingly large sauropod dinosaur that lived some 70 million years ago. The sketch below is of the somewhat smaller* Titanosaurus, *which it closely resembled.*



Dave Walsten

William Simpson with fossil skull of Mastodon *about 10,000 years old found in 1960 near Medaryville IN The right tusk had been broken off in life (We know this because the stub is smooth) This upset the balance of the head and provoked an arthritic condition where the skull and neck met A hole, from an abscess, can be seen above the tusk socket The molars were badly decayed All in all one mean rogue elephant*

Dave Walsten

John Harris, Department of Geology preparator who joined the staff in 1969, works on foreleg of an uintathere, a 45 million-year- old mammal collected in 1979 in Wyoming's Washakie Basin The field trip was led by William D. Turnbull, curator of fossil mammals, and the specimen discovered by Murray Daniels, of Rawlins, WY a field party member. When Harris has finished his restoration, the specimen will go into the Museum's study collection

FIELD MUSEUM TOURS

INDIA

Courtesy Patson Travel, Inc

For a brochure on this tour or reservation information please write or call the Tours Office at Field Museum, 322-8862.

Looking for the past?...it lives on, alongside the present, in India. There is no archaic past in this ancient land, only a gentle continuity. The past soars triumphantly in the sculptured temple towers; in the citadels and minarets, as at Akbar's capital of Fatehpur Sikri near Agra. India lives also in the modernity of its cities...cosmopolitan Bombay and Delhi, the capital. This merging of past and present is perhaps the strength and the attraction of India and the basis of its universal appeal. Our tour will give you a good overview of both.

Our first introduction to India will be in Delhi and we'll spend time sightseeing in Old and New Delhi. We'll visit the Red Fort, one of the world's most magnificent palaces—a city within a city, and containing the Pearl Mosque. We'll stop at Raj Ghat, the hallowed spot where Mahatma Gandhi was cremated. We'll enjoy India's most spectacular national festival, Republic Day, January 26; observed in New Delhi. Special seats have been reserved for our group. In contrast to the ancient monuments, we'll experience a 20th-century city where *sarees* mingle with pantsuits. Delhi is a great melting pot of ideas, of fashions, of lifestyles, where a past vital and alive, enlivens a dynamic present. India's museums and art galleries display and classic and contemporary. Visitors will find objets d'art that speak of a vital and living tradition.

You could spend all your time in India in remote, unspoiled areas enjoying its wealth of wildlife. We'll visit Kanha Park which is one of the richest faunal areas in India and part of the Banjar Valley Reserve, so well known to hunters until recent years. This sanctuary was set up to save the magnificent hard-ground barasingha deer which was dwindling rapidly and had reached the verge of extinction. Today there are about a hundred of these left and they are practically limited to the Kanha area. The tiger, chital, leopard, hyena, gaur and the wild pig will be seen here among the vultures, black ibises and the crested serpent-eagle. Kanha is now a tiger reserve under Project Tiger.

January 21–February 12
Tour Price: $3,500

Experience Bombay, and a visit to Aurangabad and the famous caves of Ajanta and Ellora (celebrated as one of the true wonders of the ancient world). One would be hard put to match the grandeur, the exuberance and spiritual inspiration of this art that hangs like tapestry from sacred rocks.

The famed Keoladeo Ghana sanctuary at Bharatpur is a bird watcher's paradise. Almost 300 different species of waterbirds winter in its swampy marshes, including ducks, teals, geese, and Siberian cranes. The boat will take you past little and large cormorant nests where the grey heron lives together with the painted stork. We will see egret, dazzling white, that breed in small colonies. We'll tour one of the oldest cities in the world, Varanasi, which has a wealth of temples. It is also the home of Benares Hindu University. We'll have a chance to visit the shops with a fabulous storehouse of silks and brocades.

At Kaziranga Park you will have an opportunity to view the wildlife while riding on an elephant. The most striking feature of this sanctuary is that it is possible to see a lot of animals in a comparatively short time at close range. It is here that we expect to see the rare one-horned rhinoceros.

And there's much more: a flight over Mt. Everest and the Himalayan Region (weather permitting), a visit to the Godaveri Botanical Gardens, the Pink Palace in Jaipur and, of course, the fabulous Taj. The warm welcome of the Indian people and the comfortable hotels will make you feel at home as you experiment with a new cuisine; Indian food is not all 'curry'—it is a rich and varied fare of more than a score of traditional culinary styles.

Whether your interest lies with plant life or animal parks, ancient temples, or modern cities, natural beauty, or manmade monuments, shopping or sightseeing, you will find it on this magical tour. We hope you will consider joining us in INDIA.

FIELD MUSEUM TOURS

Papua New Guinea

Courtesy, Travel Plans International

For a brochure on this tour or reservation information please write or call the Tours Office at Field Museum, 322-8862.

May 1 — 17
Tour Price: $4,461

Papua New Guinea is unique on the face of planet Earth. For centuries a diversity of contrasting cultures have flourished here within small areas because the tribes were isolated by towering mountains that laced the island, criss-crossing back and forth through impenetrable jungle vegetation. And so, unknown to each other and to the outside world, they co-existed, each in an individual communal environment sufficient unto itself. Only now has a surface veneer of civilization begun to permeate this mysterious island so that visitors may explore and exclaim over the natural wonders of this Edenlike paradise.

It is one of the most remarkable—and last—reservoirs of animal, reptile, insect, and bird life to be found anywhere. Flightless black-and-brown plumed cassowaries, puk-puks (crocodiles), tree kangaroos and phalangers, wild ducks, and cuscus (possums)...birds the likes of which would startle even Audobon—brightly feathered parrots, colorful kingfishers, gourie pigeons, aristocratic egrets, and stately herons all vie for attention with that most matchless of all exotic creatures, the bird of paradise.

But most of all Papua New Guinea represents a repository of primitive cultures and art of such freshness and color it holds a fascination beyond all else. Each province has its own charm, whether it be the all-green, all-high Eastern Highlands or the seldom-seen Sepik watershed. To travel through the continuing contrasts of this ever-changing land, to feel the centuries slip away, is to experience a travel adventure that broadens the mind as it enriches the soul. To go from the Space Age to the Stone Age in the course of a couple of days cannot fail to be an adventure of mind-bending proportions.

The Sepik River is a monster waterway draining a vast area of grassland, swamp, and jungle in its serpentine circuit, marked by lagoons, dead ends, lakelike expansions and, in the lower reaches, huge floating islands that have been torn away from the banks. For five memorable days we will cruise the Sepik river, reaching into the past in the remote inland regions where the villages remain undisturbed by contact with the modern world. Here the villagers still travel in their traditional dugout canoes. They still erect and reside in enormous tree houses though not for the long ago purpose of escaping head-hunting raiding parties. They still make and use fanciful owl-head pots and carve copious crocodiles and hornbills, symbols of fertility and life. They continue to keep their most treasured possessions hidden away or buried, only bringing them out on special occasions. And they still create the country's most artistic artifacts, combining a natural gift for bold expression with imaginative use of locally found pigments.

Our lecturer, Dr. Phil Lewis, curator, primitive art and Melanesian ethnology, will escort the tour from Chicago and will share his knowledge of the primitive customs and traditions that play such an important part in the village life—the superstitions that govern behavior, the ancestral worship so much a facet of the spirit houses. In addition, our Sepik director, Jeff Leversidge, a well-known personality on the Sepik and Ramu Rivers, and perhaps the world's best authority on the diverse culture, art, and customs of the Sepik regions, will lecture the group during the cruise and shore excursions. Jeff is also a keen naturalist and an excellent host.

Accommodations on board the newly refurbished Melanesian Explorer are modern and comfortable. Passengers are housed in air-conditioned twin-bunked cabins, each have its own compact private bathroom facilities. The deck above the cabins has a lovely dining and lounge area, while the aft area on the top deck is completely covered and fitted with lounges and chairs so that passengers may watch the Sepik water world go by in pleasurable ease.

We hope you will join us on our very special expedition to Papua New Guinea. Early registration will ensure your reservations. Space is limited.

Kenya and the Seychelles

FIELD MUSEUM TOURS

Audrey Faden

September 12 – October 3
Tour Price: $3,750

For a brochure on this tour or reservation information please write or call the Tours Office at Field Museum, 322-8862.

There is now, as there has always been, an aura of mystery surrounding Africa. Tropical islands and the coast, endless palm-fringed beaches, snow-capped mountains on the equator, jungle primeval, savannah sun-baked plains. They are all a part of East Africa, the home of one of our planet's last great natural dramas. The wildlife...the stately processions of giraffe—dark centuries silhouetted on the African horizon. Prides of lion—stalking the plains and still lauded as the king of beasts. The beautiful and rare leopard, the elegant cheetah and surely one of the wonders of the world, the magnificent migration of wildebeeste and zebra. Sadly, time and civilization move inexorably onwards so we hope to welcome you to Kenya and the Seychelles with Field Museum Tours in 1981.

ITINERARY: Sept. 12: Evening departure from Chicago's O'Hare Airport via British Airways to London. **13:** Morning arrival in London with time to rest before evening departure for Nairobi. **14:** Morning arrival in Nairobi and transfer to Nairobi Hilton Hotel. Evening welcome party and lecture by member of the East Africa Wildlife Society. **15:** Drive through Kikuyu country for overnight stay at Mt. Lodge Tree Hotel, the newest of the well-known Tree Hotels, designed for optimum game viewing from the comfort of your balcony. **16:** Drive north and cross the equator to the Samburu Game Reserve. Overnight at Samburu Game Lodge. **17:** Full day game viewing at Samburu Game Reserve. **18:** Drive south to spend the day at the foot of Mt. Kenya at the luxurious Mt. Kenya Safari Club. **19:** Journey to Lake Naivasha, a bird-watcher's paradise. Overnight at the Lake Hotel. **20:** Drive through the Masai Mara Game Reserve for two days of game viewing by minibus in the Great Rift Valley. Overnight at the Governor's Camp. **21:** Full day at Masai Mara Game Reserve, including a game walk. **22:** Return to Nairobi and the Nairobi Hilton Hotel. **23:** Journey to Amboseli National Park, dominated by the spectacular Mt. Kilimanjaro. **24:** Morning lecture by research naturalist discussing studies of wildlife behavior. Afternoon trip to Tsavo West. Overnight at Ngulia Lodge. **25:** The safari continues through the plains of Tsavo to Taita Hills Lodge for lunch. Continue to the port city of Mombasa on the Indian Ocean. Overnight at the Leopard Beach Hotel. **26:** Morning visit to Shimba Hills Reserve. Afternoon free. **27:** Morning departure for Mahe in the Seychelles Islands. Afternoon arrival at Reef Hotel. **28–30:** Three days in the Seychelles includes a full day excursion by air to Praslin Island to visit Vallee de Mai and by boat to Cousin Island to visit the internationally renowned bird sanctuary. Optional full day excursion by air to Bird Island. **Oct 1:** Free day in Mahe. Evening flight to Nairobi, late night flight to London. **2:** Morning arrival in London. Free day to relax and explore on your own. Overnight at London Embassy Hotel. **3:** Late morning flight to Chicago via British Airways.

NEW FOR 1981

A "Journey to the Holy Land and Red Sea" is scheduled for March 12-26, 1981, aboard the privately chartered *M.S. Stella Maris* cruising yacht. This tour will include stops in Cairo and Luxor, Egypt; a visit to Quseir, a small port town on the Red Sea where Field Museum is conducting an excavation; a visit to Petra and St. Catherine's Monastery. In Israel, the tour visits the Mount of Olives, Massada, Jericho, and sites in and around Jerusalem, including Bethlehem. Please write or call for further information. Tours direct line: 322-8862.

A Christmas Afternoon at Field Museum

A SPECIAL INVITATION FOR MUSEUM MEMBERS!

Dancing and Entertainment

Thursday, December 11
4:30—7:30 p.m.

Please send me _____ adult tickets ($7 ea.) and _____ children's tickets (14 and under, $4 ea.). Total amount enclosed $ _____ .

Tickets will be mailed upon receipt of check. Reservations are limited and will be filled in order received. For additional information please call Women's Board: 922-9410.

Please send this form (or facsimile) to "A Christmas Afternoon," Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605.

Name _____
Street _____
City _____ State _____ Zip _____
Phone _____

FIELD BRIEFS

Dave Walsten

Chinese Delegation Views Chinese Bronze Exhibit

The Museum was host recently to a group of five soil scientists from the People's Republic of China, who stopped in primarily to view the current exhibit, "The Great Bronze Age of China." The men were in the United States as participants in a government-to-government technical exchange program. All are with the Ministry of Agriculture, Beijing.

Shown above are, left to right (standing): Li Zhen Yu, Wang Rui Lin, Qiu Zhen Bang (deputy chief of the Office for Preparing Overseas Exhibitions, Cultural Relics Bureau, Beijing, who is traveling with the "Great Bronze Age of China" exhibit), Chen Bing Cong, Zeng De Chao, and Ma Cheng Yuan (chief of research and installation, Shanghai Museum, and head of the Chinese delegation traveling with the Chinese Bronze exhibit). Seated: Robert C. Liu (United States Department of Agriculture escort for the five-man delegation), Herbert Sullivan (staff assistant to the vice president of engineering for agricultural equipment, Hinsdale Engineering Center, International Harvester Company, which hosted the delegation while in the Chicago area), and Hua Guo Zhu.

NEA, Illinois Arts Council Grants

Grants from the National Endowment for the Arts and the Illinois Arts Council have recently been awarded Field Museum; both grants are for $20,000.

The NEA grant, covering the period October, 1980, through September, 1981, supports a student-teacher training internship program with local colleges and universities and the teaching community. The IAC grant, covering the period September, 1980, through August, 1981, is in support of arts-related public programs.

A. A. Dahlberg, Research Associate, Honored

The degree of doctor of odontology *honoris causa* was awarded earlier this year by the University of Turku, Finland, to Albert A. Dahlberg, research associate in the Department of Geology since 1942. At the University of Chicago, Dahlberg is research associate emeritus of the Zoller Dental Clinic and the Department of Anthropology and professor emeritus of the Committee on Evolutionary Biology. Much of his research has concerned dental anthropology among Eskimo and Indian populations.

Philip G. Dibble Named Manager, Public Merchandising

The newly created position of manager of public merchandising is the title of Philip G. Dibble, who joined the Museum staff October 6. The responsibilities of the new post include the management of the Museum Shops, reproduction of Museum artifacts, contracts for the use of Museum designs, and mail order business. Dibble comes from Marshall Field & Company, where he served 26 years, most recently as vice president, Merchandising Division.

World Book Features Field Museum

Field Museum is the subject of a special report in the 1981 edition of *Science Year*, the science and technology annual of World Book encyclopedia. The 16-page feature, entitled "Keeping Nature's Diary" and written by Mark Perlberg, focuses on how a museum functions, how collections are acquired and specimens preserved, and the nature of the work of curators, exhibit preparators, and other specialists on the Museum staff.

Curatorial staff, Division of Insects (l. to r.): Rupert L. Wenzel (retired Nov. 1), Henry S. Dybas (retired Aug. 1), Larry E. Watrous, and John B. Kethley.

Dave Walsten

Division of Insects Staff Changes

Three major staff changes have occurred in the Division of Insects: Curator Henry S. Dybas retired August 1, Curator Rupert L. Wenzel retired November 1, and Larry E. Watrous joined the division in September as assistant curator.

Dybas, a lifelong resident of the Chicago area, joined the Museum staff in 1941 as assistant in zoology; in 1947 he was promoted to assistant curator of insects, in 1950 was named associate curator, and in 1972 became curator. He served as head of the division from 1970 until 1974.

Dybas received his B.S. degree from Central Y.M.C.A. College and this month will be awarded an honorary D.Sc. from Tri-State University, Angola, IN. His main research interests have included the ecology and evolution of periodical cicadas ("17-year locusts") and classification of the Ptilidae, or featherwing beetles, which include the smallest species of the order Coleoptera. As curator emeritus, Dybas continues his research work at Field Museum.

Wenzel, a native of Owen, WI, but a longtime resident of Oak Park, IL, joined the Museum staff as assistant curator of insects in 1940. (He had served as a Division of Insects volunteer in 1934-35.) In 1951 he was named curator. He was head of the Division of Insects from 1951 to 1970 and from 1978 to 1979, when he was succeeded by associate curator John B. Kethley. From 1970 to 1977 Wenzel served as chairman of the Department of Zoology.

Wenzel holds a B.A. from Central Y.M.C.A. College and a Ph.D from the University of Chicago. His special research interest has concerned the taxonomy, biology, evolution and zoogeography of beetles of the family Histeridae; battlies of the family Streblidae; and host-parasite relationships of ectoparasites, especially of bats. As curator emeritus, he will continue his research work at the Museum.

Wenzel, accompanied by his wife, recently returned from a visit to Japan and to the People's Republic of China. In Kyoto, Japan, he spoke at a symposium of the 16th International Congress of Entomology. In China, as a member of a delegation from the Entomological Society of America, he visited various entomological research institutes and university departments in Kwangchow, Hangchow, Shanghai, and Beijing. In Shanghai Wenzel was a speaker at the Shanghai Institute of Entomological Research.

Larry E. Watrous joined the Division of Insects as assistant curator following completion of his doctoral studies at Ohio State University, from which he also holds an M.S. degree. His B.S. degree is from the University of Connecticut. Watrous's doctoral dissertation was on the genus *Colopterus* (Coleoptera, Nitidulidae). His field work has included expeditions to the Philippines and Malaysia and to Mexico.

Associate Curator John B. Kethley, who joined the Division of Insects in 1970, continues as head of the division. He had also served as division head from 1974 to 1978.

Quaker Oats Promotes Field Museum

Several months ago Life cereal, a product of Quaker Oats Company, featured on the reverse side of the cereal package a picture essay on dinosaurs, and readers were invited to write Field Museum for additional information about dinosaurs. As a consequence, many hundreds of letters have come to the Museum from youngsters (and parents) requesting this material. (Some of these letters were featured in an article in the October, 1980, *Bulletin*.)

Now the dinosaur packages have been followed by an Indian "edition." Sixteen million boxes of Life, with Field Museum's North American Indian life and culture exhibits featured on the reverse side, are moving onto the shelves of grocery stores in the United States and Canada. Some of the packages offer a free pen-and-poster set, which includes four 14x17-inch color posters of different aspects of Indian life.

BOOKS

Edward S. Curtis in the Land of the War Canoes: A Pioneer Cinematographer in the Pacific Northwest, by Bill Holm and George Irving Quimby. University of Washington Press, Seattle, 1980, 132 pp. 58 illus. $19.95.

This well illustrated book records the history of the making, rediscovery, and reediting of *In the Land of the Head Hunters*, the first full-length ethnographic film of native North Americans. The film was made on the Northwest Coast by Edward S. Curtis in 1913, and depicts the Kwakiutl prior to European contact.

The book will be of particular interest to acquaintances of the Field Museum of Natural History, since the only remaining copy of the original movie was donated to Field Museum by a collector of old films, Hugo Zeiter, in 1947. George Quimby, then Field Museum's curator of exhibits, recognized that it was the work of the famous photographer of American Indians and writer of the twenty-volume reference, *The North American Indians*. Bill Holm, of the Thomas Burke Memorial Washington State Museum, first heard about the Curtis film from Kwakiutl who participated in its original making. This started his search for the film which he found at the Field Museum in 1962.

In 1965 Quimby also joined the staff of the Thomas Burke Museum, bringing with him a copy of the film. Together, Quimby and Holm edited the film, which they retitled *In the Land of the War Canoes*. The book details how the original film was modified: Sound was added, the speed adjusted, and lightness and darkness were balanced. In some scenes the motion was smoothed out by adding frames, while other scenes were shortened. Out-of-sequence segments were put in proper order. A portion of one scene that had been lost was reenacted, and another scene, in which the evil shaman emerges from the mouth of a whale, was deleted.

The new version of the Curtis film is a valuable teaching tool used widely in Northwest Coast studies. The film includes the only existing shots of traditional Northwest canoes in use. It also shows better than any footage ever taken since, the movement of Kwakiutl dancers and the use of ceremonial equipment; and much of what was filmed is no longer practiced. Because of the excellence of the film and the special relationship that the film has with the Field Museum, segments from the original film will be used in the museum's new Northwest Coast exhibit, scheduled to open in Hall 10 in 1982.

Photographs taken during the original filming appear here for the first time. Edmund August Schwinke, a cameraman and assistant to Curtis, took candid photographs of the participants and props. These photographs made it possible for Holm and Quimby to reconstruct the filming process. The Schwinke stills also reveal attitudes of the participants: Curtis swinging from a railing, "the fierce warriors" relaxing between scenes; another Schwinke photograph shows George Hunt, the famous Kwakiutl author and ethnographer who provided much of the substance for the Franz Boas, Edward Curtis, and Samuel Barrett works on the Kwakiutl, with a megaphone standing beside Curtis.

The photographs present a favorable impression of Curtis and allow for a better understanding of the Kwakiutl's attitude toward the film. The book also contains data collected by Bill Holm from the actual people who were filmed.

The book is readable and worthwhile for anyone with an interest in the history of anthropology, photography, or cinematography, the ethnography of the Kwakiutl, or the biography of Curtis or Hunt. It should be on the top of the reading list for anyone who has seen either *In the Land of the Head Hunters* or *In the Land of the War Canoes*.

—Ronald L. Weber
Visiting Assistant Curator
for the Northwest Coast Area

OUR ENVIRONMENT

Condor Chick Death Under Investigation

The Fish and Wildlife Service has announced the results of an autopsy on the California condor chick that died during examination by a biologist on June 30, indicating the cause of death as "shock and acute heart failure." According to service officials, the heart failure resulted in excess fluid in the lungs, depriving the bird of adequate oxygen.

The San Diego Zoo's autopsy report said that moderate obesity—apparently common in wild baby chicks while they are still in the nest—could have contributed to the chick's death. Separate analyses were also conduced by the service's Patuxent Wildlife Research Center, indicating only trace amounts of environmental contaminants in the bird.

The service is conducting a review of the circumstances surrounding the condor's death, and will await these findings (along with the results of experiments with Andean condors and other vultures in South Africa and Peru) before reapplying for permits necessary to continue work as part of the California condor recovery program.

Florida Key Deer Recovery Plan

A recovery plan which has as its objective the stabilization of the Florida Key deer (*Odocoileus virginianus clavium*) population, as opposed to an effort to boost its numbers, has been approved by the Fish and Wildlife Service. Although the population has apparently stabilized at around 350-400 deer, high mortality from road kills and a limited range keep this species in jeopardy.

A distinct geographical race of the Virginia white-tailed deer (*Odocoileus virginianus*), the key deer is the smallest race found in the United States. The average weight of an adult male is 80 pounds and an adult female weighs about 63 pounds. The average shoulder height ranges from 24 to 26 inches.

The center of the Key deer population is Big Pine Key, Florida, with an estimated 200-250 deer. Road kills by automobiles are the most serious threat to the deer on Big Pine Key, accounting for 76 percent of known mortalities of key deer from 1968 to 1973. (Other mortalities were caused by drowning, combat between males, capture for tagging, and unknown factors.)

Key deer are strongly attracted to newly burned areas, and will feed extensively on new woody and herbaceous growth for up to 6-9 months. Availability of drinking water seems to influence the distribution of Key deer throughout their range. Periods of drought find the deer utilizing the larger keys, with water, in favor of the smaller keys without drinking water.

To preserve the Key deer, the plan not only emphasizes the importance of maintaining the population level and available habitat, but also the integrity of the subspecies. According to the plan, because the Key deer are the product of a unique system of selective forces (a restrictive, insular environment with no natural predators), management should involve the retention of those natural selection factors that influenced their evolution. Under no circumstances, according to the plan, should a captive zoo-bred herd be considered for restocking purposes.

What the plan does call for, among other things, is the acquisition of more land for the Key Deer National Wildlife Refuge, established in 1957. Key deer habitat is being developed rapidly, and their range is already extremely limited. The only way to ensure adequate protection of this habitat is to incorporate it into the National Wildlife Refuge System.

Efforts to protect the herd and the integrity of the subspecies would include prohibition of hunting, restricting dogs from refuge lands, reducing speed limits, posting deer warning signs, and fencing highways except at trail crossing points.

Other items covered in the plan are public awareness, monitoring the deer population, experimenting with habitat manipulation, and conducting studies on the natural history and population dynamics of the Key deer herd.

Rare California condor chick that died while undergoing examination.

U.S. Fish and Wildlife Service

Algae as Fertilizer

Using algae in place of nitrogen fertilizer has the potential of helping the agriculture industry cut energy costs by almost 30 percent, according to researchers at Battelle's Pacific Northwest Laboratories. Researchers in Battelle's Food and Agriculture Section are testing several species of algae as substitutes for nitrogen fertilizer. Nitrogen is an essential nutrient for plant growth and production of plant proteins.

The production of nitrogen fertilizers accounts for 30 percent of the energy used by the agriculture industry, observes a Battelle research scientist, adding that as a solar energy product, algae's only major requirement for growth is sunlight, and that's free.

"We're looking at several species of blue-green, soil algae that can take nitrogen from the air and incorporate it into its cell mass where it is later used as fertilizer by plants," he says. The algea could be grown in large amounts and applied to the soil to provide nitrogen. Or, he says, a small amount could be put in the soil where it would grow to provide the necessary nitrogen.

Batelle researchers have recently completed a project to compare tomato plants grown using nitrogen-producing algae and plants grown using a commercial fertilizer. In their tests, algae supplied the proper amount of nitrogen for the tomato plants and also induced 45 percent more growth than what was observed in those treated with the same amount of commercial fertilizer. The 45 percent weight gain was observed when the plants were measured both wet and dry. The researchers measured weight gain only and did not let the tomato plants bear fruit. The researchers attributed the weight gain to the secretion of a plant growth hormone by the algae.

Blue-green algae bloom are used in Asia to provide nitrogen for rice production, note the Battelle researchers. This could also be done in the United States, they say, through appropriate engineering and agricultural practices.

Bird Problems Aren't Funny

A shaving cream manufacturer once used terse jingles printed on signs tacked to fenceposts along highways for advertising. "Listen birds," one sequence read, "These signs cost money . . . Roost awhile, but don't get funny!"

"If birds could read signs," notes a U.S. Fish and Wildlife Service spokesman, "it would solve some horrendous problems we have throughout our country. How fine it would be if a NO TRESPASSING sign would protect a farmer's cornfield from blackbirds; or a DETOUR sign would shunt birds around airport runways; or an OFF LIMITS TO GULLS sign would save the remaining tern nesting colonies on an East Coast barrier island."

As it is, Fish and Wildlife Service scientists have spent years studying bird habits and populations in an effort to find effective, environmentally safe methods of reducing bird damage. Most of the techniques developed are designed to frighten birds away, but the service has also conducted research on humane, selective methods of killing birds when it is necessary to reduce their numbers in local areas.

During the early spring when their numbrs are at a low ebb, there are about 430 million blackbirds in the United States. After nesting, their numbers more than double to 900 million. A typical flock contains about 40 percent red-winged blackbirds, 22 percent grackles, 20 percent starlings, 15 percent cowbirds, with the balance distributed among other species of blackbirds.

Large concentrations roost together in trees to share one another's body heat during the night. Sometimes their roosts are in towns where the incessant yammer of as many as one million birds in a small grove can create a serious disturbance. The accumulated guano left on the ground not only creates a stench, but eventually kills the trees and—insidiously—forms a breeding place for the human disease, histoplasmosis.

Blackbirds also cause an estimated $50 million in damage to corn, wheat, rice, cherries, grapes, sunflowers, and other crops throughout the country each year. Starlings flock into feedlots, polluting with their droppings the grain intended for fattening livestock.

These birds also cause problems for other wildlife. Starlings, which were introduced to the United States in the late 19th century, have multiplied rapidly and have taken over many nesting cavities, displacing native birds such as wood ducks, bluebirds, tree swallows, and woodpeckers. Grackles feed on the eggs and young of other birds and have caused considerable losses among white-winged doves in Texas. The female cowbird is a nest parasite, laying her eggs in the nests of other birds and letting the foster parents raise her large, robust young—usually at the expense of the rightful siblings. Cowbird parasitism has been especially hard on the Kirtland's warbler, an endangered species that nests only in one area in Michigan.

Blackbirds often can be driven from crops or roosting trees by persistent use of scare devices such as shotguns, propane cannons, firecrackers, or recorded bird-distress calls. Sometimes, however, these tactics merely transfer the problem elsewhere. Then the only alternative, says the Fish and Wildlife Service, is to reduce the local blackbird population. One non-poisonous and very selective method is to spray the blackbirds on cold nights when they are concentrated in roosting trees. The spray, PA-14, breaks down the oil in feathers, removing the birds' natural waterproofing and insulation, thus causing them to die of exposure. Spraying and other damage control methods are carefully carried out to ensure that other species are not harmed.

Like blackbirds, gull populations have also rocketed to unprecedented numbers. And, similarly, their population explosion is related to human activities. Uncovered garbage dumps, the offal from fish-processing plants, and litter have given gulls seemingly unlimited food supplies—and they have flourished as never before.

Gulls have become a hazard at several airports and also have—like some of the blackbirds—encroached upon the traditional nesting grounds of other birds. Their most apparent inroads have been upon the terns on the barrier island off the New England coast. About 1960, gulls invaded Monomoy National Wildlife Refuge, an eight-mile-long island just below Cape Cod. Since then they have spread their own nesting colonies over almost the entire island, destroying the tern nesting colonies until only a few tern colonies remain. Among the five species of terns represented is the roseate, a tern that is being considered for the endangered species list.

To protect Monomoy's terns, the Fish and Wildlife Service recently began a program to kill a limited number of gulls with DRC 1339, a poison that attacks the kidneys of birds, causing them to die painlessly in their sleep within 72 hours. Mixed with margarine and spread on pieces of bread, the poison bait is being placed in the nests of gulls that are encroaching on tern areas. Inasmuch as the gulls are garbage eaters, and terns are not, the poison is selective and has been very successful so far. The service is careful to reduce the numbers of only the offending birds.

Though birds cause serious problems at times, they often are of incalculable value to farmers. Gulls kill locusts. Blackbirds kill weevils, earworms, and rootworm beetles. Grackles eat cutworms and mice in newly plowed fields. Cowbirds feed on insects that harass grazing livestock. Starlings feed on the notorious Japanese beetle.

"The trouble is," says a Fish and Wildlife spokesman, "they all come back to help harvest the crop. Our objectives are not primarily to kill gulls, blackbirds, or other animals, but to save the wild diversity of wildlife we enjoy so much, and at the same time save crops and livestock from needless waste."

November & December at Field Museum

November 15 through December 15

NORTH AMERICAN INDIAN HERITAGE DAY
Sunday, Nov. 23, 11 a.m.—4 p.m.

Continuing Exhibits

THE INSECT WORLD. View butterflies from many parts of the world, of turquoise, purple, orange, and red hues. The iridescent Less butterfly of Madagascar displays eight dazzling colors itself. Moths range in size from the Hercules of New Guinea, with a 10-inch wing span, to the tiny Blackberry Borer. Rivaling the Hercules is the huge African Rhinoceros beetle—8 inches long, including 2-inch-long pincers. Main floor, outside Hall 21.

GAMELAN. This 24-piece Javanese orchestra consists of brightly painted gongs, drums, and brass xylophones. Javanese legend says that a spirit lives in the great gong of every gamelan; his duty is to make sure the gamelan is played. Most of the instruments in the Museum's gamelan were played at the 1893 Columbian Exposition. Hall K, ground floor.

FRIEND OR FOE? THE NATURAL HISTORY GAME. The object of this game is to determine which specimen is harmful and which is not. See if you can distinguish a vampire bat, a head-hunter's axe, or a poisonous snake from its benign look-alike. Ground floor.

New Programs

EDWARD E. AYER FILM LECTURES. Explore some countries and cities of Europe through these lively travel films. Narrated by the filmmakers themselves, the 90-minute programs continue through November. Admission is free through the West Door; bring membership card for priority seating. Recommended for adults. Saturdays, 2:30 p.m., James Simpson Theatre.

- ☐ Nov. 15: "Paris" with Kathy Dusek.
- ☐ Nov. 22: "Peoples of Romantic Europe" with William Sylvester.
- ☐ Nov. 29: "Ireland" with Robert Davis.

NORTH AMERICAN INDIAN HERITAGE DAY. Experience the rich and diverse culture of native North Americans by participating in this free, day-long celebration. See traditional intertribal dances as well as art and craft demonstrations;

go on a guided tour of the permanent Indian collections; enjoy a fashion show of native American dress; view special films; play Indian games, and much more. Events will be held in Stanley Field Hall and throughout the Museum; a complete schedule will be available at the program. Planned in conjunction with Chicago's American Indian Center, and partially funded by the Illinois Arts Council. Tickets are not required. Sunday, Nov. 23, 11 a.m.—4 p.m.

NATURE ODYSSEY. Enjoy a day of free natural history films for families. Short subjects, animated folk tales, and fea-

ture films will give you a fascinating film experience. Included are such Museum favorites as "The Owl Who Married a Goose," "The Living Legend," and "Sea Otters at Play." Tickets are not required. Sunday, Dec. 14, 11 a.m.–4 p.m., James Simpson Theatre.

WEEKEND DISCOVERY PROGRAMS. Participate in a variety of free tours, demonstrations, and films on natural history topics every Saturday and Sunday between 11 a.m. and

3 p.m. Check the Weekend Sheet available at Museum entrances for locations and additional programs.

☐ "The World of Gold" surveys gold: its uses, physical properties, and mining procedures. Saturday, Nov. 15, noon.

☐ "Welcome to the Field" provides visitors with a microcosm view of the "behind-the scenes" activities at a natural history museum. Saturday, Nov. 15, 1 p.m.

☐ "Ethnographic Reality: Cultural Studies on Film" Film Feature: *Imaginero* presents the story of an Indian folk artist living in the barren country of northwest Argentina. Sunday, Nov. 16, 1 p.m.

☐ "Welcome to the Field." Saturday, Nov. 22, 1 p.m.

☐ "Welcome to the Field." Saturday, Nov. 29, 1 p.m.

☐ "American Indian Dress" examines the construction, craft, style, and symbolism of Indian dress from the northern woodlands to the Southwest. Saturday, Dec. 6, 11:30 a.m.

☐ "The World of Gold." Sunday, Dec. 7, 1 p.m.

☐ "American Indian Medicine" looks at various Indian beliefs regarding disease and illness, methods of healing, and Indian contributions to modern medicine. Saturday, Dec. 13, 11 a.m.

☐ "Archeology of the Illinois Valley" explores what archeologists are discovering about 10,000 years of Indian adaptations. Sunday, Dec. 13, 1 p.m.

Continuing Programs

VOLUNTEER OPPORTUNITIES. Individuals with scientific interests and backgrounds are needed to work in various departments of the Museum. Contact the Volunteer Coordinator, 922-9410, ext. 360.

NOVEMBER AND DECEMBER HOURS. The Museum is open from 9 a.m. to 4 p.m., Monday through Thursday; 9 a.m. to 5 p.m., Saturday and Sunday; and 9 a.m. to 9 p.m., Friday.

THE MUSEUM LIBRARY is open weekdays from 9 a.m. to 4 p.m. Closed Thanksgiving, Nov. 27. Obtain a pass at the reception desk, main floor.

MUSEUM TELEPHONE: (312) 922-9410

ILLINOIS NATURAL HISTORY
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For Christmas Give Field Museum

Whether you are trying to decide on a Christmas gift for the small child or for "the man who has everything," a gift of Membership in Field Museum is always appropriate.

For the adult, a Membership can provide a wealth of opportunities to further explore the realm of natural history; for the child it can open the doors to a lifetime of scientific interest or professional endeavor. Infinitely more than a storehouse of fascinating specimens and exhibits, Field Museum offers to its Members at every age level a varied selection of exciting learning experiences via the classroom, workshop, laboratory, film lecture, or field trip.

Perhaps equally important: with a Field Museum Membership you are giving a shared relationship, for Field Museum is indeed its Members.

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

December 1980

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CALENDAR for *1981*

Field Museum of Natural History Bulletin

December 1980
Vol. 51, No. 11

Editor/Designer: David M. Walsten
Production: Martha Poulter
Calendar: Mary Cassai
Staff Photographer: Ron Testa

Field Museum of Natural History

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Director: Lorin I. Nevling, Jr.

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by Edward Olsen, curator of mineralogy

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Features photos of outstanding minerals at Field Museum

back cover **December and January at Field Museum**
Calendar of coming events

COVER

Photomicrograph of amphibolite specimen from Peppler Lake, Ontario. Field of view 4mm. This is a view of grains of amphibole, pyroxene, and magnetite as they occur in a type of metamorphic rock. The approximate alignment of the grains is due to nonuniform pressure during crystallization. Photographed through a petrographic microscope with partially crossed polars. Photo by Edward Olsen. Other photomicrographs, also by Olsen, appear in the calendar section for the month of May.

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FIELD MUSEUM TOURS

INDIA

January 21–February 12
Tour Price: $3,500

Looking for the past? . . . it lives on, alongside the present, in India. There is no archaic past in this ancient land, only a gentle continuity. The past soars triumphantly in the sculptured temple towers; in the citadels and minarets. India lives also in the modernity of its cities . . . cosmopolitan Bombay and Delhi, the capital. This merging of past and present is perhaps the strength and the attraction of India and the basis of its universal appeal. Our tour will give you a good overview of both.

HOLY LAND & THE RED SEA

March 12–26
Tour Price: $3,625–$3,995
(depending on cabin class)

This tour, aboard the privately chartered *M.S. Stella Maris* cruising yacht, will include stops in Cairo and Luxor, Egypt; a visit to Quseir, a small port town on the Red Sea where Field Museum is conducting an excavation; a visit to Petra and St. Catherine's Monastery. In Israel, the tour visits the Mount of Olives, Massada, Jericho, and sites in and around Jerusalem, including Bethlehem.

FIELD MUSEUM TOURS

PAPUA NEW GUINEA

May 1–17
Tour Price: $4,461

Papua New Guinea is unique. For centuries a diversity of contrasting cultures have flourished here within small areas because the tribes were isolated by towering mountains that laced the island. And so, unknown to each other and to the outside world, they co-existed, each in an individual communal environment sufficient unto itself. Only now has a surface veneer of civilization begun to permeate this mysterious island so that visitors may explore and exclaim over the natural wonders of this Edenlike paradise.

KENYA & THE SEYCHELLES

September 12–October 3
Tour Price: $3,750

There is now, as there has always been, an aura of mystery surrounding Africa. Tropical islands and the coast, endless palm-fringed beaches, snow-capped mountains on the equator, jungle primeval, savannah sun-baked plains. They are all a part of East Africa, the home of one of our planet's last great natural dramas. We hope to welcome you to Kenya and the Seychelles with Field Museum Tours in 1981.

Please write or call for further information. Tours direct line: 322-8862.

1981—A Year of Minerals

by Edward Olsen
Curator of Mineralogy

All gems are minerals, but not all minerals are gems. This does not mean that only gem minerals are attractive. If any mineral crystallizes in a geological setting where it is not misshapen and crammed between other minerals, there is a chance it will form exquisite crystals with pleasing geometrical shapes. Well formed crystals are bounded by *natural* smooth surfaces, called crystal faces. Although they appear to be similar to the facets we see on gemstones, they must not be confused with them. Gem facets are put there by design, the gemcutter's art. In this 1981 calendar are some of Nature's "gems." These are attractive minerals that have crystallized in their own natural forms—some delicate, some meticulously geometrical, some bizarre.

A few of the photographs, however, are of the opposite kind of growth—where each mineral is crammed against other mineral grains, each distorted, warped, and limited in the size to which it could grow. These are photomicrographs of rock—thin sections—sections cut so thin that light can pass through the mineral grains forming the rock, revealing the internal structures. (See cover photo and the two photos for May in calendar.) These photomicrographs rival some works of modern art in their flamboyant displays of colors, shapes, and patterns.

Collections of minerals, such as Field Museum's, can grow, over the decades, in several ways: field collecting, purchases, exchanges, and donations of specimens and talents by friends of the Museum. In the right photo, below, Public Relations assistant Kathryn Slocum admires a group of gemstones recently donated to the Museum. The largest is a faceted kunzite of 506.24 carats, from Brazil. The round stone, center, is a 303.73 carat moonstone cabochon from India. Both stones were the gift of Ragnar W. Nordlof, Park Ridge, IL. The third largest is a 24.46 carat star garnet from Kellog, Idaho, and a gift of Roy Barnes, St. Maries, ID. The smallest is a 5.626 carat synthetic emerald created by Union Carbide Corp., and the gift of Glenn Commons, Aurora, IL.

At the left is the late Walter F. Kean of Riverside, IL, an electronics engineer by profession but, by avocation, a gemcutter of extraordinary talent. In Field Museum's mineral collection there had been many gem minerals of excellent quality that had never been faceted. Over a period of almost a decade Kean, who died in 1975, gave his superb skill to cutting and faceting a group of gemstones from this stock of minerals. All of the stones on which he worked are on exhibit today in the Museum's Higinbotham Hall of Gems.

Walter F. Kean

Dave Walshen

Kathryn Slocum

JANUARY

FIELD MUSEUM OF NATURAL HISTORY

DECEMBER

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FEBRUARY

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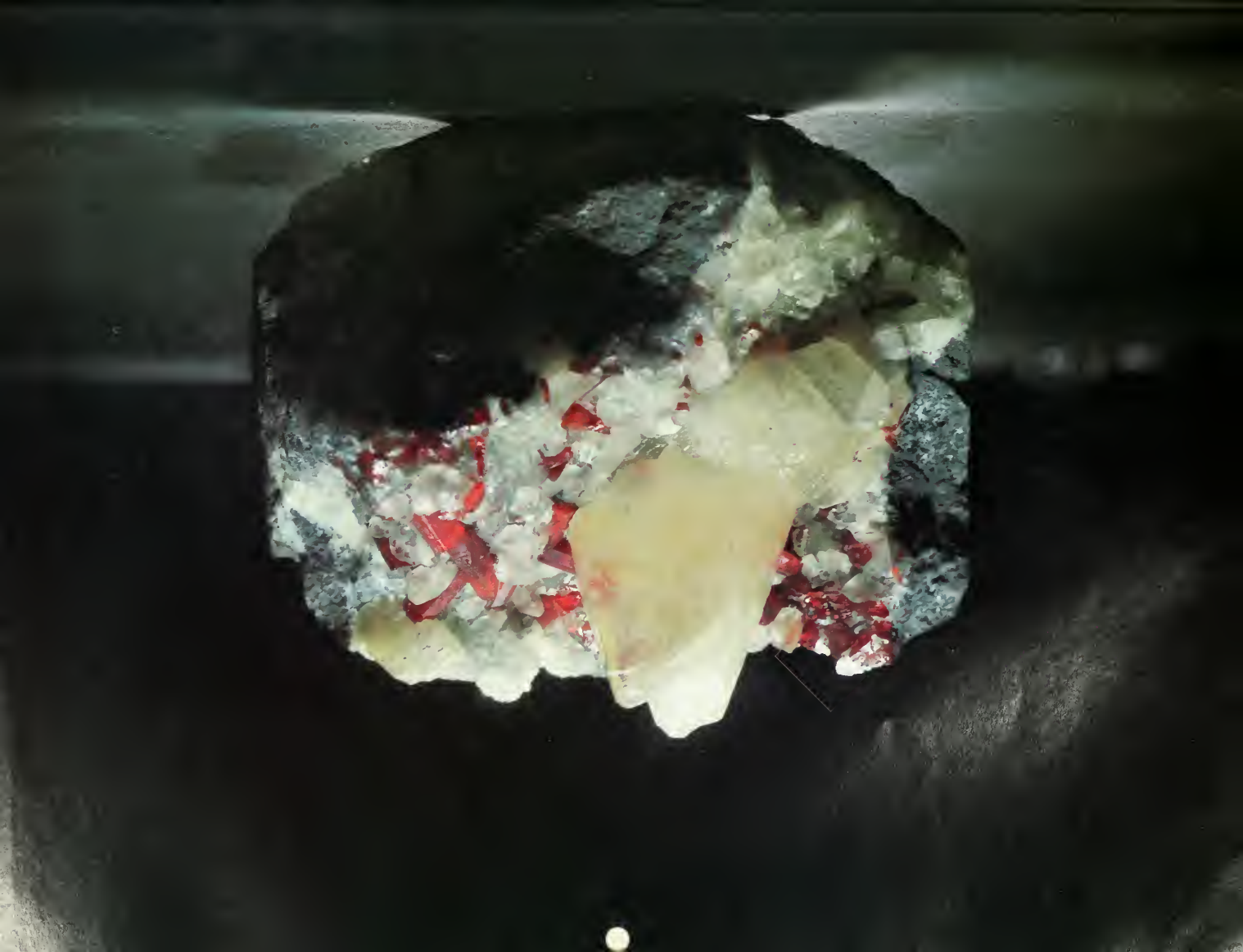
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				NEW YEAR'S DAY Museum closed *Earth at perihelion. 91.4 million miles from sun* 1	*year's latest sunrise 7:14 a.m. C.S.T. Jan. 1 & 6* 2	Discovery Programs each Saturday, Sunday 3
Quadrantid meteor shower: 100/hr 4	Teachers: Plan now to visit Museum with classes in February and March 5	*new moon* 6	7	8	9	Winter Workshops for children begin 10
11	12	*first quarter* 13	14	15	16	17
Latin American Neighbors Day 18	19	*full moon* *penumbral eclipse of moon, visible all over N. America* 20	Register now for Winter Adult Education courses 21	22	23	24
25	26	*last quarter* 27	28	29	30	31



FEBRUARY

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2 Groundhog Day	3 Winter Adult Education Courses begin	4 new moon; Winter Adult Education Courses begin; annular eclipse of sun; visible in so. hemis.	5 Winter Adult Education Courses begin	6	7 Discovery Programs each Saturday, Sunday
8	9	10	11 first quarter	12 LINCOLN'S BIRTHDAY	13	14 Valentine's Day
15	16 WASHINGTON'S BIRTHDAY	17	18 full moon	19	20	21
22 Learning Museum special event: African dance	23	24	25	26 last quarter	27	28 Learning Museum special event: Afro Blue

JANUARY

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MARCH

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Specimen size: 50 cm.

MARCH

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Discovery Programs each Saturday-Sunday 1	2	3	Ash Wednesday 4	5	new moon 6	Ayer Film Lecture "Tahiti" 2:30 p.m. 7
8	9	10	11	first quarter 12	13	Ayer Film Lecture "Germany" 2:30 p.m. 14
15	16	St. Patrick's Day 17	18	19	full moon Kroc Environmental Lecture: Ben Bova, exec. editor, *Omni*, 8 p.m. First Day of Spring 20	Ayer Film Lecture "Immortal Poland" 2:30 p.m. 21
22	23	Register now for Spring Adult Education courses 24	25	26	27	last quarter Ayer Film Lecture "Shangri-La" 2:30 p.m. 28
29	30	31				

FEBRUARY

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April

Field Museum of Natural History

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	*new moon* Ayer Film Lecture "Turkey" 2:30 p.m. 4
Discovery Programs each Saturday, Sunday 5	6	Register now for Kroc Environmental Field Trips 7	8	9	10	*first quarter* Ayer Film Lecture "Scotland" 2:30 p.m. 11
Palm Sunday 12	13	Spring Adult Education Courses begin 14	Spring Adult Education Courses begin 15	Spring Adult Education Courses begin 16	Good Friday 17	Ayer Film Lecture "Lure of Alaska" 2:30 p.m 18
full moon PASSOVER, EASTER 19	20	*Lyrid meteor shower; 15/hr* 21	22	23	24	Ayer Film Lecture "Amazon" 2:30 p.m. 25
Will the Great Lakes Survive?" film/lecture program Daylight Savings Time Begins 26	*last quarter* 27	28	29	MEMBERS' NIGHT 30		

MARCH

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MAY

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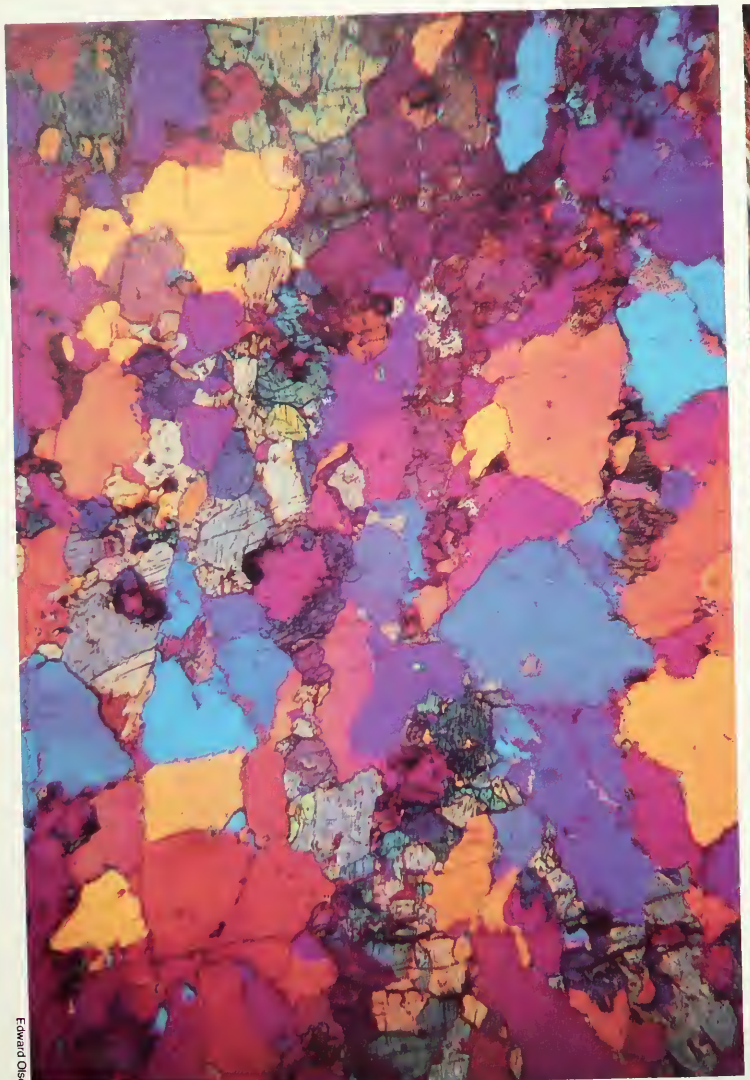
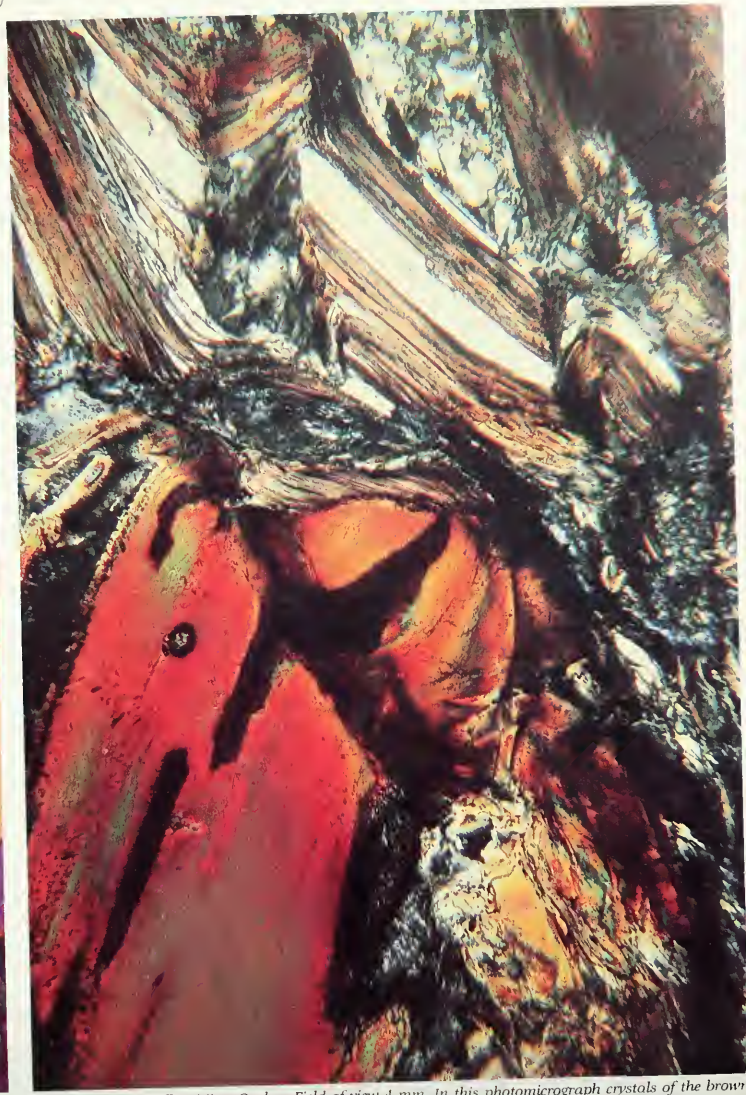


Edward Olsen

Skarn *from Peppler Lake, Ontario, Canada. Field of view 4 mm. In this view are interlocking grains of calcite, quartz, pyroxene, and some amphibole. This metamorphic rock was once a sandy limestone that has been subjected to heat, causing new minerals to form.*



Rodingite *from Jeffrey Mine, Quebec. Field of view 4 mm. In this photomicrograph crystals of the brown mica mineral, biotite, are bent and contorted by pressure. The mica occurs embedded in masses of tiny grains of the mineral antogorite. A rodingite is an unusual kind of metasomatic rock.*

MAY

FIELD MUSEUM OF NATURAL HISTORY

APRIL

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JUNE

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					MEMBERS' NIGHT 1	Field Museum's present building opens 1921 2
new moon 3	Eta Aquarid meteor shower, 18/hr 4	5	6	7	8	Kroc Environmental Field Trips begin 9
Mother's Day first quarter Kroc Environmental Field Trips begin 10	11	12	13	14	Katbakali—Indian Dance Drama by Asia Society 8:00 p.m. 15	16
International Museum Day celebration 17	full moon 18	19	20	21	22	23
24/31	MEMORIAL DAY 25	last quarter 26	Register now for Summer Fun Workshops 27	28	29	30

JUNE

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		new moon				
	1	Field Museum opens 1894 2	3	4	5	6
"World of Whales" film program 7	8	*first quarter* 9	*year's earliest sunrise 4:07 a.m., C.S.T June 10-19* 10	11	12	13
Flag Day "World of Whales" film program 14	15	Summer Adult Education Courses begin 16	*full moon* Summer Adult Education Courses begin 17	Summer Adult Education Courses begin 18	19	20
"World of Whales" film program Father's Day First Day of Summer 21	22	23	*last quarter* 24	25	*year's latest sunset 7:26 p.m., C.S.T* 26	*year's latest sunset 7:26 p.m., C.S.T* 27
"World of Whales" film program 28	29	30				

MAY

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JULY

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JULY

FIELD MUSEUM OF NATURAL HISTORY

JUNE

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			new moon 1	2	*Earth at aphelion: 94.5 million miles from sun* 3	INDEPENDENCE DAY 4
Discovery Programs each Saturday, Sunday 5	Highlight Tour 1:00 p.m. 6	Highlight Tour 1:00 p.m. Summer Fun Children's Workshops begin 7	Highlight Tour 1:00 p.m. *first quarter* 8	Highlight Tour 1:00 p.m. 9	10	11
12	Highlight Tour 1:00 p.m. 13	Highlight Tour 1:00 p.m. 14	Highlight Tour 1:00 p.m. 15	Highlight Tour 1:00 p.m. *full moon* *partial eclipse of moon; visible in most of U.S.* 16	17	18
Asia Matsuri (Festival Day) 19	Highlight Tour 1:00 p.m. 20	Highlight Tour 1:00 p.m. 21	Highlight Tour 1:00 p.m. 22	Highlight Tour 1:00 p.m 23	*last quarter* 24	25
26	Highlight Tour 1:00 p.m. 27	Highlight Tour 1:00 p.m 28	Highlight Tour 1:00 p.m. 29	Highlight Tour 1:00 p.m *new moon* *total eclipse of sun; visible in Alaska, Asia* *Delta Aquarid meteor shower 38/hr* 30	31	

Steel is the base of our whole industrial society. Specimen size: 9.5 cm.

AUGUST

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30					1
Register now for Kroc Environmental Field Trips 2	Highlight Tour 1:00 p.m. 3	Highlight Tour 1:00 p.m. 4	Highlight Tour 1:00 p.m. 5	Highlight Tour 1:00 p.m. 6	 *first quarter* 7	Discovery Programs each Saturday, Sunday 8
9	Highlight Tour 1:00 p.m. 10	Highlight Tour 1:00 p.m. *Perseid meteor shower; 65/hr* 11	Highlight Tour 1:00 p.m. *Perseid meteor shower; 65/hr* 12	Highlight Tour 1:00 p.m. *Perseid meteor shower; 65/hr* 13	14	 *full moon* 15
16	Highlight Tour 1:00 p.m. 17	Highlight Tour 1:00 p.m. 18	Highlight Tour 1:00 p.m. 19	Highlight Tour 1:00 p.m. 20	21	 *last quarter* 22
23 30	24 Highlight Tour 1:00 p.m. 31	Highlight Tour 1:00 p.m. 25	Highlight Tour 1:00 p.m. 26	Highlight Tour 1:00 p.m. 27	28	 *new moon* 29

commercial uses, the most familiar of which is as a coating on steel—galvanized iron. Specimen size: 10 cm.

SEPTEMBER

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Register now for Fall Adult Education Courses 1	2	3	4	5
first quarter 6	LABOR DAY 7	Teachers. Plan now to bring your classes on a field trip to Field Museum 8	9	10	11	Kroc Environmental Field Trips begin 12
full moon Kroc Environmental Field Trips begin 13	14	15	16	17	18	Discovery Programs each Saturday Sunday 19
last quarter 20	21	First Day of Fall 22	23	24	25	4th Annual Festival of Anthropology on Film American Indian Day 26
new moon 4th Annual Festival of Anthropology on Film 27	28	ROSH HASHANAH 29	30			

AUGUST

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

OCTOBER

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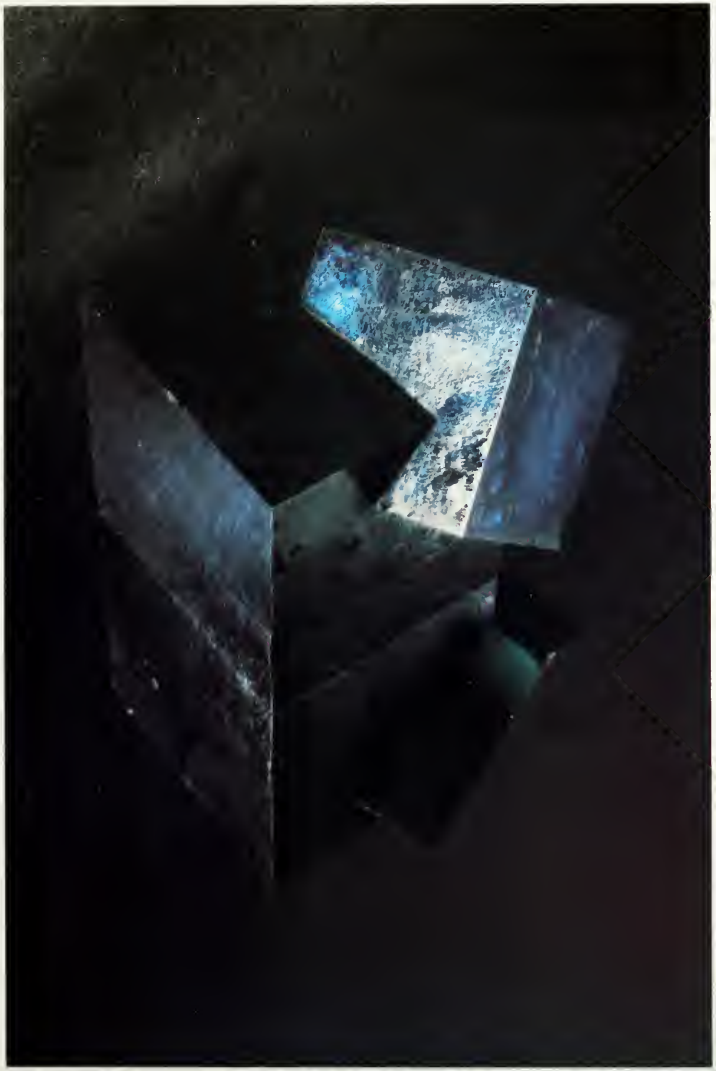
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

OCTOBER

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30			1	2	Ayer Film Lecture "France" 2:30 p.m. 3
Discovery Programs each Saturday, Sunday 4	5	first quarter 6	7	YOM KIPPUR 8	Draconid meteor shower: 10/hr 9	Ayer Film Lecture "Quebec Whales and Labrador Tales" 2:30 p.m. 10
11	Columbus Day 12	full moon Fall Adult Education Courses begin 13	Fall Adult Education Courses begin 14	Fall Adult Education Courses begin 15	16	Ayer Film Lecture "Egypt" 2:30 p.m. 17
18	last quarter 19	Orionid meteor shower: 38/hr 20	21	22	Kroc Environmental Film Lecture "Follow a Wild Dolphin" by Dr. Horace Dobbs 23	United Nations Day Ayer Film Lecture "Austria" 2:30 p.m. 24
Daylight Savings Time Ends 25	26	new moon 27	28	29	30	Halloween Ghoul's Tour Ayer Film Lecture "Yugoslavia" 2:30 p.m. 31



Ron Testa

Ron Testa

Pyrite (FeS_2) *("fool's gold") occurs in many forms. The sharp, pristine cubes (left) are from Rio Tinto, Spain (8 [illegible] is actually a spherical cluster of small, interlocking cubes. Pyrite is a minor ore of iron, but is a major ore of sulfur, which has numerous industrial and agricultural uses.*

NOVEMBER

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			first quarter			Ayer Film Lecture "The Mediterranean" 2:30 p.m.
1	2	3	4	5	6	7
Discovery Programs each Saturday, Sunday			Veterans Day (Armistice Day)			Ayer Film Lecture "Lucky Australia" 2:30 p.m.
8	Taurid meteor shower; 16/hr 9	10	full moon 11	12	13	14
			last quarter			Ayer Film Lecture "Spain" 2:30 p.m.
15	Leonid meteor shower; 15/hr 16	17	18	19	20	21
2nd Annual North American Indian Heritage Day				new moon THANKSGIVING DAY		Ayer Film Lecture "Denmark" 2:30 p.m.
22	23	24	Andromedid meteor shower; 10/hr 25	Andromedid meteor shower, 10/hr 26	Andromedid meteor shower 10/hr 27	28
29	30					

OCTOBER

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DECEMBER

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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Building construction. Specimen size: 12 cm.

DECEMBER

FIELD MUSEUM OF NATURAL HISTORY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	*first quarter* 4	Family Film Festival 11:30 a.m., 1:30 p.m. 5
Discovery Programs each Saturday, Sunday 6	*year's earliest sunset 4:41 p.m., C.S.T. Dec. 7-8* 7	8	9	10	*full moon* 11	Family Film Festival 11:30 a.m., 1:30 p.m. 12
Gemmid meteor shower: 55/hr 13	14	15	16	17	*last quarter* 18	Family Film Festival 11:30 a.m., 1:30 p.m. 19
20	First Day of Winter HANUKAH 21	22	23	24	CHRISTMAS Museum closed 25	*new moon* 26
27	28	29	30	31		

NOVEMBER

S	M	T	W	T	F	S
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22	23	24	25	26	27	28
29	30					

JANUARY

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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

ILLINOIS NATURAL HISTORY
SURVEY LIB RM 116
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URBANA ILL 61801

December and January at Field Museum

(December 15 through January 15)

Continuing Exhibits

AMERICAN MAMMALS. In this hall you can see four groups of white-tailed deer that Carl Akeley prepared around the turn of the century. These famous exhibits show the seasonal differences in the appearance of deer, and are the first large dioramas depicting animals in realistic environments. This method, pioneered by Akeley at Field Museum, has since been adopted by modern museums everywhere. Hall 16, main floor.

PLACE FOR WONDER. Touch the tooth of a woolly mammoth, examine a chocolate chip starfish, or play musical instruments from China in this gallery full of touchable exhibits. Volunteers help guide exploration. Open weekdays 1-3 p.m.; weekends 10 a.m.-noon and 1-3 p.m. Ground floor.

New Programs

WINTER JOURNEY. "Heading South: Adventures of a Canada Goose." Follow the migratory adventures of this bird as it travels south to find food and a warmer climate. On its way, the goose encounters many animal neighbors. Self-guided tour; free *Journey* pamphlets available at Museum entrances.

WEEKEND DISCOVERY PROGRAMS. Participate in a variety of free tours, demonstrations, and films every Saturday and Sunday between 11 a.m. and 3 p.m. Check the *Weekend Sheet* available at Museum entrances for locations and additional programs.

- ☐ "The Culture of Ancient Egypt," tour. Saturday, Dec. 20, 1 p.m.
- ☐ "Chinese Ceramic Traditions," tour. Saturday, Dec. 20, 2 p.m.
- ☐ "Many Mexicos," tour. Sunday, Dec. 21, 1 p.m.
- ☐ "Highlight Tour." Saturday, Jan. 3, 1 p.m.
- ☐ "Welcome to the Field," tour. Sunday, Jan. 4, 1 p.m.
- ☐ "China Through the Ages," tour and slide presentation. Saturday, Jan. 10, 2 p.m.
- ☐ "Animal Babies," tour. Sunday, Jan. 11, 11:30 a.m.
- ☐ "Chinese Ceramic Traditions." Sunday, Jan. 11, 1:30 p.m.

WINTER FUN. Children ages 5 to 9 can take part in workshops on natural history topics on Saturday, January 10, 17, 24, and 31. Most workshops meet once for either 60 or 90 minutes. For times and registration information, call or write Field Museum's Public Programs, Department of Education: 322-8854, Mon.-Fri.

- ☐ "Animals in their Winter Homes." Children learn how animals adapt and protect themselves in the winter. In English and Spanish for ages 5-6. Members $3, nonmembers $4. Jan. 10 or 24.
- ☐ "Pinch Pots" (ages 5-6) and "Pottery Workshop" (ages 7-9). Children hand-build their own pots in these three-session workshops. Members $12, nonmembers $15. Jan. 10, 24, and 31.
- ☐ "Nature Lab." Young people examine a variety of specimens under a microscope—human and animal hair, leaves, insects, and more. Ages 8-9. Members $5, nonmembers $6. Jan. 10 or 24.
- ☐ "Our Feathered Friends." Children learn what birds they can see in the Chicago area during the winter and construct a birdfeeder to bring home. Ages 8-9. Members $5, nonmembers $6. Jan. 10 or 24.
- ☐ "Animal Art." Children tour the mammal halls, learn animal behavior, and draw their favorite animals. Morning sessions for ages 5-6; afternoon workshop for ages 7-9. Members $4, nonmembers $5. Jan. 10 or 24.
- ☐ "Egyptian Hieroglyphs." Children see a film on ancient Egypt and learn to write their names in picture script. Ages 7-9. Members $5, nonmembers $6. Jan. 17 or 24.
- ☐ "Indian Games." Girls and boys learn Indian games, hear native American stories and music, and make Indian playthings. Morning sessions for ages 5-6 (Members $4, nonmembers $5); afternoon workshops for ages 7-9 (Members $5, nonmembers $6). Jan. 10, 17, 24, or 31.
- ☐ "Days of the Dinosaurs." Children tour Hall 38 and make dinosaurs out of clay or draw these ancient reptiles. Sessions for ages 5-6 and ages 7-9. Members $4, nonmembers $5. Jan. 17 or 31.

Continuing Programs

VOLUNTEER OPPORTUNITIES. Individuals with scientific interests and backgrounds are needed to work in various Museum departments. Contact the Volunteer Coordinator, 922-9410, ext. 360.

DECEMBER AND JANUARY HOURS. The Museum is open 9 a.m.-4 p.m. Monday-Thursday; 9 a.m.-5 p.m., Saturday and Sunday; and 9 a.m.-9 p.m., Friday. Closed Christmas and New Year's.

THE MUSEUM LIBRARY is open weekdays 9 a.m. to 4 p.m. Obtain a pass at the reception desk, main floor. Closed Christmas and New Year's.

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